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December, 1975

Blue Jay

A JOURNAL OF NATURAL HISTORY AND CONSERVATION
FOR SASKATCHEWAN AND ADJACENT REGIONS

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BLUE JAY

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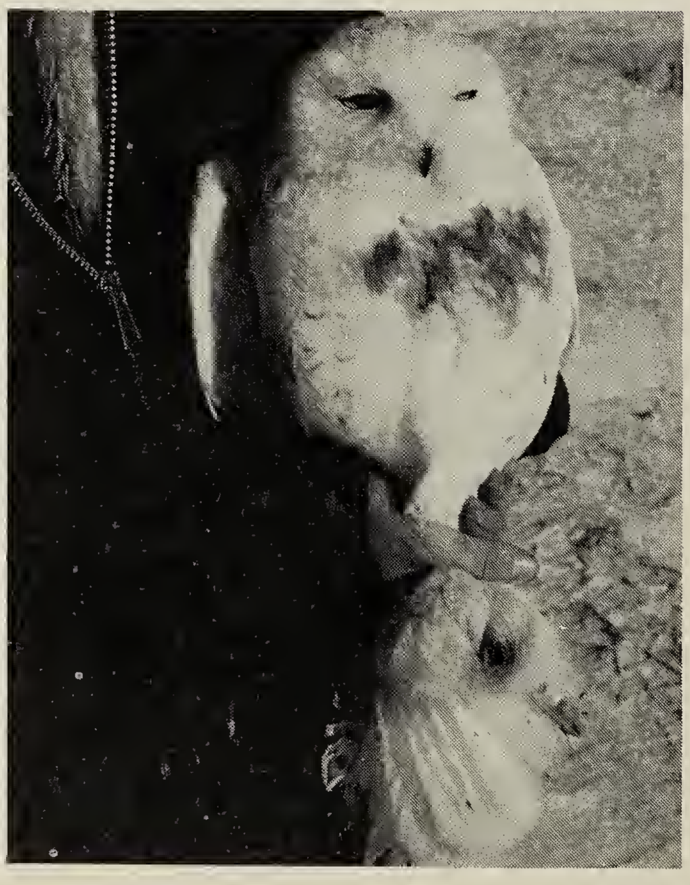
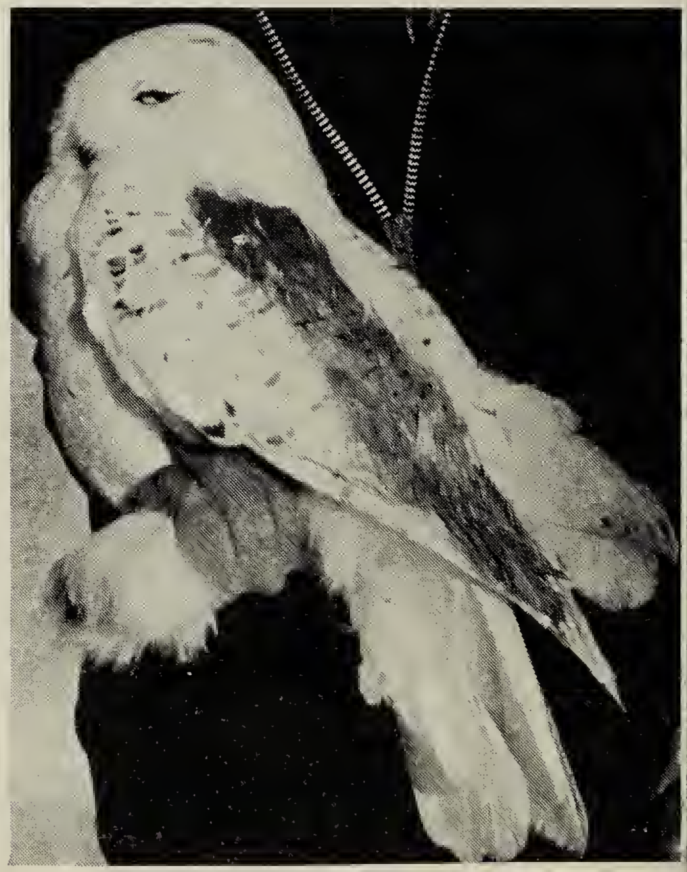
REQUEST FOR SIGHTINGS OF COLOUR-MARKED SNOWY OWLS

This winter Snowy Owls will be live-trapped in the Saskatoon area and portions of the wings and tail will be dyed blue in order to study winter movements and behaviour. Anyone observing one of these owls should carefully note which areas are dyed since the dye will be applied in various combinations to the primaries, secondaries and tail in order to identify individuals. Since the colour-marking is most readily observed in flight, it may be necessary to flush an owl in order to determine exactly what portions of it are dyed. However, people are requested not to continually flush or otherwise harass these marked birds since it may cause them to change their behaviour or to leave the area. The date, time, areas of blue and location of these sightings should be reported to

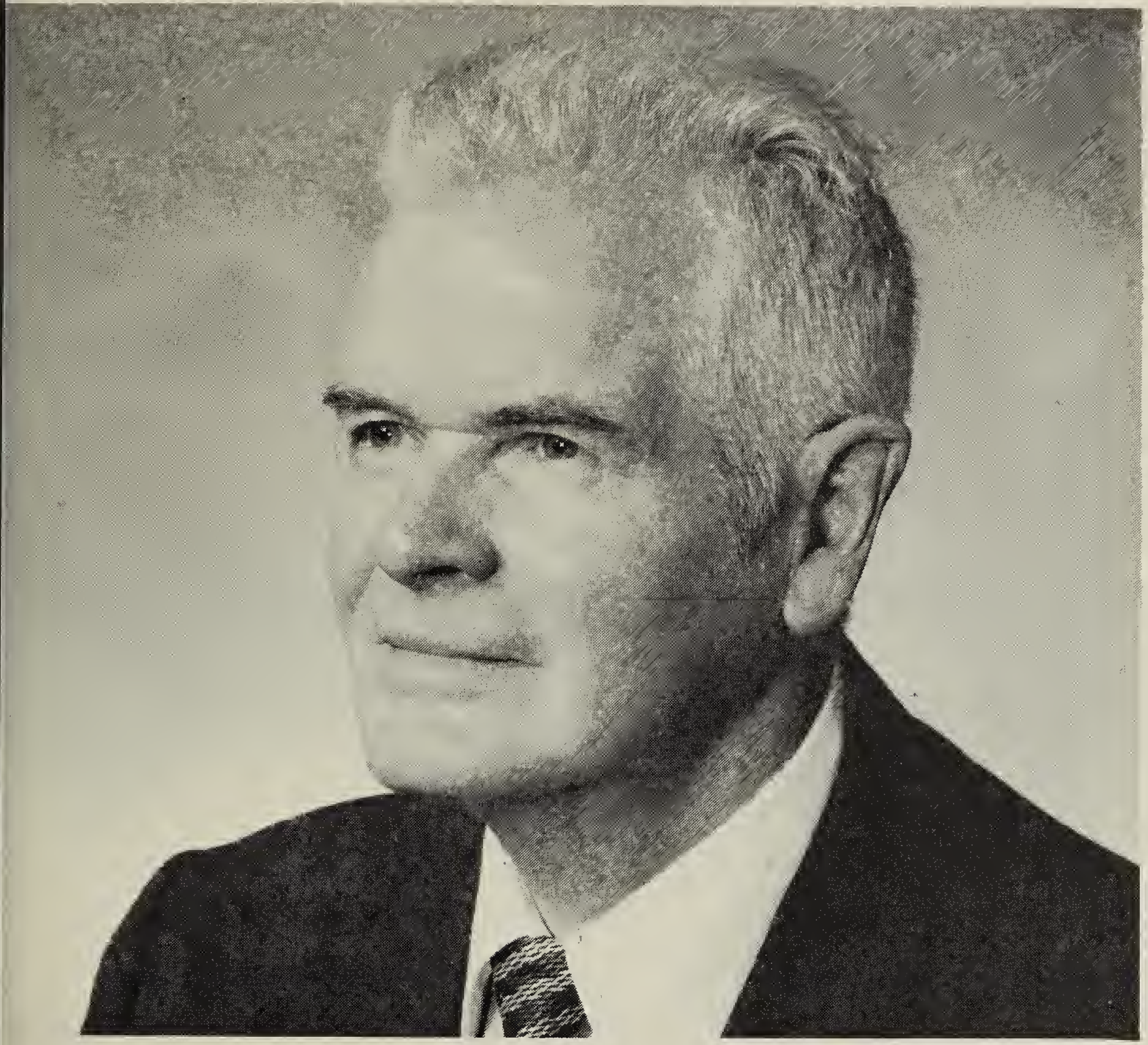
Adam Schmidt,
318 Ave. U North,
Saskatoon, Sask., S7L 3C7.
Telephones:
373-3933, 374-7808, 382-7984.





Coloured-marked Snowy Owls

A. Schmidt



DR. JOHN LANE — IN MEMORIAM

by ELIZABETH R. CRUICKSHANK*

Dr. John Lane died July 23, 1975, at is home in Brandon, Manitoba. He vas 72. For 45 years Jack carried on is railroad job, putting his best into is work. All those years he was as eenly aware of the natural world bout him as during his boyhood when t was his consuming interest — specially birds.

A devoted family man, he received both assistance and encouragement from his loving wife, Nora, and from his son and daughter of whom he was very proud. Even before retirement in 1968, he gave unselfishly and enthusiastically of his time and energy to improving the lot of his feathered friends. At the same time, he devoted himself to young people, arousing and encouraging their interest in the birds' world. In his later years he became Curator of the B. J. Hales Museum for which he had voluntarily worked for years.

---

*2329 Athol Street,
Regina, Saskatchewan.

On request he wrote "The life history of the Baird's Sparrow" for the prestigious Bent's *Life Histories of North American Birds*. He presented a paper, based on his well documented observations, on "Hybridism of bluebirds" at the American Ornithologists' Union meeting in Toronto in 1967. He was awarded the Cliff Shaw Memorial Award by the S.N.H.S. for his outstanding contributions to its journal, the *Blue Jay*. The Shikar Safari International Society named him Conservationist of the Year, as did the Manitoba Wildlife Federation. He received the Gold Medal of the Manitoba Historical Society in recognition of his contribution to youth — developing in them an appreciation of our native avifauna. The Manitoba Good Citizenship award, the Golden Boy, came to him for his selfless, important endeavors.

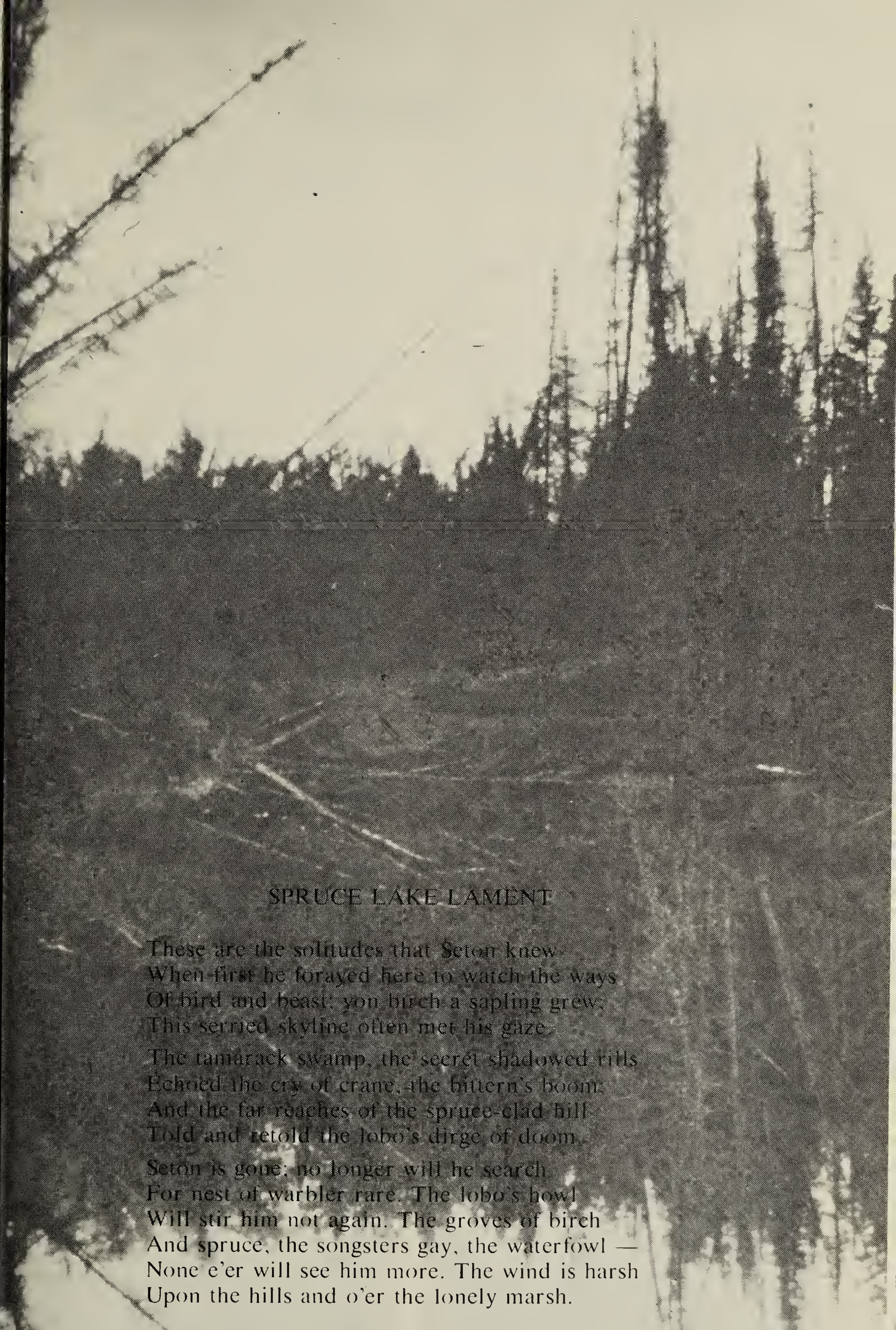
To crown his career, the University of Manitoba conferred on him an Honorary Doctor of Laws degree. He was saluted in the citation as "Naturalist, conservationist, writer, sportsman, and accomplished nature photographer."

His labour of love, that of enticing the bluebirds back to Manitoba, was the subject of a fine article in *Reader's Digest* in September, 1973, by Fred McGuinness. It was titled "The man who brought the bluebirds back."

The final tally of nest boxes he and his "boys" had erected along the highways and byways was over 4,500. The trail went from Broadview to McGregor, north to Dauphin and south to Glenboro. A significant percentage of the Junior Birders, 200 membership, who were fortunate to come under his tutelage, have been inspired to pursue studies related to the life sciences for their life work.

Rev. Murray Simmons, conducting his funeral service in Central United Church, Brandon, quoted one of Jesus' favourite sayings: "Whoever seeks to save his life will lose it, but whoever loses his life will save it and live." "Instead of trying to husband his strength, Jack devoted himself to a significant cause, to others, and so to the enrichment of the lives of others and to the enrichment of his country. Thereby he himself gained an immensely richer life and satisfaction, greater powers of observation and of expression, an ever expanding circle of friends, an entrance into fellowship with scientists and artists. Experience gave him a finer appreciation of classical music, an ever fresh zest for living and the rich joys of sharing his interests with others and inspiring young people to worthwhile living. His achievements provide one more example of how unbelievably much may be accomplished in this needy world through one person who dedicates himself to a significant purpose or cause and devotes all his energy toward its fulfilment."

As a friend of many years of Jack and Nora, and one who shared their interests, I echo Mr. Simmons' sentiments. And of the many poems Jack penned I have chosen the one he composed on the day of Ernest Thompson Seton's death. Jack, as the great naturalist before him, also roamed the Carberry Sand Hills. Jack called his poem "Spruce Lake Lament." (Substitute Jack's name for that of the man he mourned.)



SPRUCE LAKE LAMENT

These are the solitudes that Seton knew
When first he forayed here to watch the ways
Of bird and beast; yon birch a sapling grew;
This serried skyline often met his gaze.

The tamarack swamp, the secret shadowed rills
Echoed the cry of crane, the bittern's boom;
And the far reaches of the spruce-clad hill
Told and retold the lobo's dirge of doom.

Seton is gone; no longer will he search
For nest of warbler rare. The lobo's howl
Will stir him not again. The groves of birch
And spruce, the songsters gay, the waterfowl —
None e'er will see him more. The wind is harsh
Upon the hills and o'er the lonely marsh.

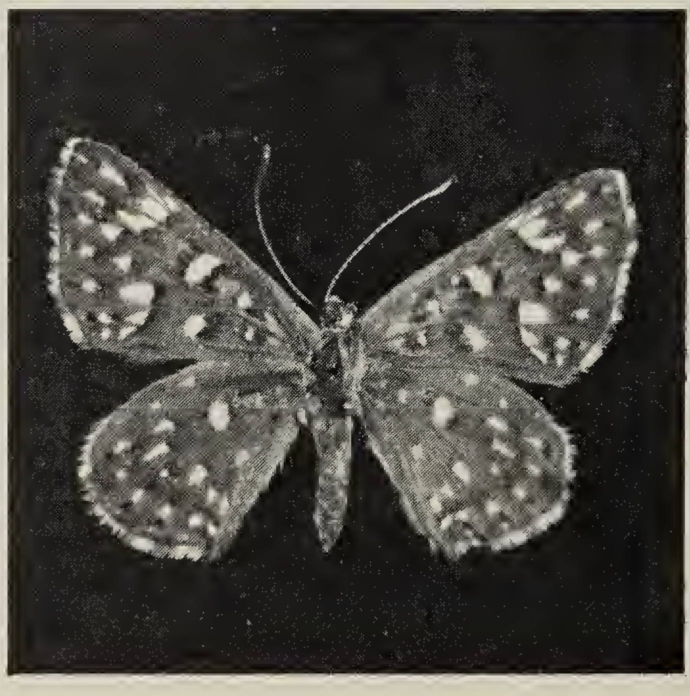
Dr. John Lane's memory will remain ever green in the hearts of those nearest and dearest to him and in those of his many friends.

CANADA'S FIRST METALMARK BUTTERFLY RECORD

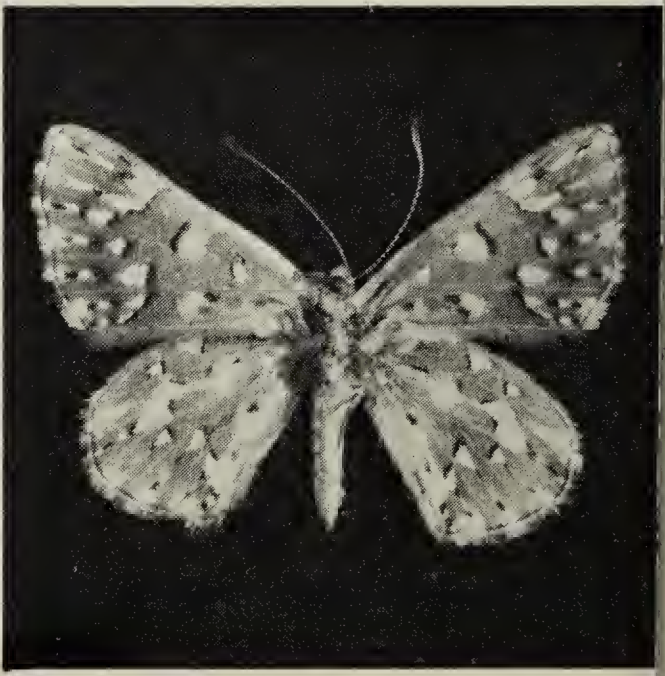
by RONALD R. HOOPER*

The Metalmark family (*Riodinidae*) is mostly a tropical family of butterflies, with many species found in Central and South America and a few in Africa and India. Only one species is found in Europe. Twenty species are recorded for the United States, but only three of these occur in the northern states. Two, the Northern Metalmark (*Lephelisca borealis* — Grote and Robinson) and the Swamp Metalmark (*Lephelisca muticum* — McAlpine), should be watched for in Southern Ontario. We have been watching for the third species, the Mormon Metalmark (*Apodemia mormo* — Felder and Felder), in Saskatchewan since it was collected in the North Dakota badlands. The capture of a fresh specimen of Mormon Metalmark in Saskatchewan's Killdeer Badlands (west of Killdeer) on August 8, 1974, was the first record of this family for Canada.

When I took the specimen I was on an insect collecting field trip for the Saskatchewan Provincial Museum. Under a thin layer of cloud not many butterflies were active, but I was collecting a few specimens of Acmon Blue (*Plebejus acmon* — Westwood and Hewitson) in the end of a canyon among branched eriogonum (*Eriogonum multiceps* — Nees). The occurrence of the Mormon Metalmark in this habitat, and its fresh appearance indicate that it was probably raised there because Eriogonum is the food plant in other areas.



Mormon Metalmark - upper side.



Lower side. Ronald Hoope

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*Box 205,
Fort Qu'Appelle, Sask.
S0B 1S0

The specimen is a male. It has a wingspread just over 1 inch. On the upperside it is orange on the forewings and dark grey on the hindwings. Both fore- and hind-wings are crossed by a series of white spots. Our specimen is darker on the hindwings than those from much farther south, but it resembles specimens from North and South Dakota.

The Metalmarks resemble the gossamer-winged butterflies (*Lycaenidae*) but the males have forelegs that are not suited for walking and the part of these legs known as the coxae are elongated into spurs. They also have a humeral vein in the hindwing, which is lacking in the lycaenids. Many species have metallic marks in the wings that give them their common name.

Even where metalmarks occur, they are often difficult to find. This may be partly due to the fact that they will sometimes land in the shade on the underside of leaves. Perhaps this is why our specimen was active on a hazy day.

FIELD GUIDE TO AQUATIC INSECT FAMILIES*

by D. M. LEHMKUHL**

Among insects, something like 100 families of a dozen orders which include thousands of species can be found in the streams, rivers, lakes, bogs and springs of North America. Investigations of freshwater habitats by naturalists and students as well as by professional biologists have been hampered by this variety. Keys and guidebooks are too often non-existent, incomprehensible by the non-specialist, very expensive or out-of-print. The objective of this pictorial key and field guide is to provide a readily accessible and non-technical introduction to identification of most of the North American families of aquatic insects.

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*Reprints are available from the author.

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The practical solution for teaching and survey purposes to the great diversity of insects has been identification to the order and family level. Identification to genus and species has remained the realm of the specialist. This should not be overly discouraging because it is often the family level that we treat as being significant in everyday life and it is this level that often has a common name. For example, mosquitoes are the Family Culicidae and black flies are the Family Simuliidae. Knowing this is probably ample for most people and it takes an above-average enthusiast to care which of the 7 genera and 37 species of mosquitoes is attacking him in Saskatchewan since all the welts look about the same. For those who do care, the necessary publications are listed at the end of this section.

This pictorial key should work for all of North America (with a western bias due to my personal experience). I have avoided technical terms and characters whenever possible. I have also attempted to use characters which can be seen with the naked eye or with a 10X hand lens; only rarely will a microscope be necessary. Thus, the key should be useful in field as well as laboratory and, hopefully, it can be used by anyone, regardless of background.

Plates and Illustrations. The important identifying features are illustrated diagrammatically in the nine plates of pictorial key. In the following six plates about two-thirds of the families treated in the key are illustrated by photographs. This is adequate for some groups such as the Stoneflies (Plecoptera) where all families basically look alike except for details described in the key. There are other look alikes also. Baetidae and Metretopodidae (not illustrated) resemble Siphlonuridae (Fig. 10). Ephemeridae resemble Polymitarcidae (Fig. 9). Tricorythidae resemble Caenidae (Fig. 4). Lestidae are similar to Coenagrionidae (Fig. 14). Macroveliidae (Fig. 27) look very much like Veliidae, Mesoveliidae and Hebridae. Nepidae resemble huge Hydrometridae (Fig. 26) and Naucoridae look like small versions of Belostomatidae (Fig. 22). Great variety can be found in the cases of Caddisflies while the larvae are quite uniform, yet differing as indicated in the key. In other groups, such as Mayflies (Ephemeroptera) and Flies (Diptera), so much diversity is found that some types are not illustrated.

Collecting and Preserving. We are concerned here with only the aquatic stages of insects and any aquatic habitat is likely to yield interesting specimens. No possibility should be overlooked because some specialized insect can be found in almost any type of habitat. Collecting in the same water area at different seasons will produce different kinds of insects and different stages of growth of the same insects.

Useful collecting equipment includes rubber boots, a white enamel pan or photographic developing tray, a pair of forceps, a "turkey baster", a notebook, and a net or two as sold by aquarium shops and biological supply houses. Place 1 or 2 inches of water from the pond or river into the white pan. Then sweep the net through vegetation or debris stirred up from the bottom and put the collected material into the pan. Rocks held over the pan can be rinsed off with the baster. A variety of life should be easily visible swimming around against the white background. Specimens can now be picked up with forceps or baster and transferred to collecting bottles where they can be preserved in alcohol (80% ethyl is best, rubbing alcohol will work). All should be labelled with the location and date of collection and the name of the collector. Labels can be written in soft pencil or permanent ink and the label is best placed inside the vial or bottle. If desired, adult beetles (Coleoptera) and bugs (Hempitera) may be pinned.

Aquariums. Aquatic insects represent the full ecological spectrum — herbivores, decomposers, carnivores and even parasites (Hymenoptera, not in key). Thus the possibilities for observing ecological principles in an aquarium, or even keeping a few "pets", should not be overlooked.

Use of the Key. Begin at the top of the page and you will always find two opposing statements connected by a heavy line. Read each statement, decide which is true for your specimen, and then follow the heavy line leading from the true statement. You will then find another pair or triplet of contrasting statements. Again, decide which fits your animal and follow the "true" line. Sooner or later you will reach a name and you will have identified your specimen. Begin with the key to orders and then turn to the key of families for the appropriate order.

Scope of the Key. The key should work for all insects which live in or on water but one may sometimes find land insects which have fallen into the water. Beware of this. Since the objective of this key is primarily to identify the organisms, information on their biology and ecology will have to be obtained from other sources, some of which are at the end of this article. A brief summary of biological information is given in the table.

Possible Problems and Useful Hints. - Only *adult insects* have large wings which can be used in flight but sometimes the wings are difficult to recognize because they are modified into hard, shell-like structures (beetles and true bugs). If you are suspicious, try to lift the part in question with a pin. Mature nymphs have small non-functional wing buds which cannot be used in flight. *Collembola* are minute, often black, insects found on the surface of water. *Nymphs and larvae:* Young grasshoppers are typical insect nymphs while caterpillars and maggots are typical larvae. Forming a mental image of these contrasting types will help you make the proper selection at this step. *Non-Insects*: with the exception of Diptera larvae, most aquatic insects have six legs. If you find a specimen with more or fewer and if it is not in the key to families of Diptera, you are probably not dealing with an insect. Other keys must be used for non-insects such as the books by Pennak or by Ward and Whipple listed below.

Acknowledgements. I would like to thank John Waddington for taking many of the photographs and preparing the final plates. Drawings and photographs are based on specimens from the author's collection. A long succession of students in university and high school classes have squinted at mimeographed copies of the key as a test of its workability, and to them I am grateful. The editorial staff of the *Blue Jay*, especially Bernard Gollop and Ed Driver were helpful in every way and made preparation of the manuscript a pleasure.

GENERAL

BORROR, D. J. and D. M. DeLONG. 1954. *An introduction to the study of insects.* Holt, Rinehart, and Winston.

BORROR, D. J. and R. E. WHITE. 1970. *A field guide to the insects of America north of Mexico.*. Houghton Mifflin, Boston, 404 p.

PENNAK, R. W. 1953. *Freshwater invertebrates of the United States.* Ronald Press. New York. 769 p.

USINGER, R. L. 1963. *Aquatic insects of California with keys to the North American genera and California species.* Univ. Calif. Press. 508 p.

WARD, H. B. and G. C. WHIPPLE. 1959. *Freshwater Biology.* 2nd Ed. W. T. Edmondson (ed.) Wiley, New York. 1248 p.

COLLEMBOLA

MAYNARD, E. A. 1951. *Monograph of the Collembola or Springtail Insects of New York State.* Ithaca, N.Y.: Comstock Publ. Co. 339 p.

EPHEMEROPTERA

BURKS, B. D. 1953. *The mayflies or Ephemeroptera of Illinois.* Bull. Illinois Nat. Hist. Surv. 26: 1-216.

LEHMKUHL, D. M. 1970. *Mayflies in the South Saskatchewan River; Pollution indicators.* Blue Jay. 28: 183-186.

NEEDHAM, J. G., J. R. TRAVER and Y. HSU. 1935. *The biology of mayflies.* Ithaca, N.Y.: Comstock Publ. Co. 759 p.

ODONATA

LEHMKUHL, D. M. 1975. *Saskatchewan Damselflies and Dragonflies.* Blue Jay 33: 18-27.

NEEDHAM, J. G. and M. J. WESTFALL, Jr. 1955. *A manual of the dragonflies of North America.* Univ. Calif. Press. 615 p.

WALKER, E. M. 1953. *The Odonata of Canada and Alaska. The Zygoptera-Damselflies.* Vol. I, Univ. Toronto Press.

———, 1958. *The Odonata of Canada and Alaska. The Anisoptera - Four Families.* Vol. II, Univ. Toronto Press.

WALKER, E. M. and P. S. CORBET. 1975. *The Odonata of Canada and Alaska.Libellulidae.* Vol. III, Univ. Toronto Press.

PLECOPTERA

FRISON, T. H. 1935. *The stoneflies, or Plecoptera, of Illinois.* Bull. Illinois Nat. Hist. Surv. 20: 281-471.

HARDEN, P. H. and C. E. MICKEL. 1952. *The Stoneflies of Minnesota (Plecoptera).* U. of Minnesota. Ag. Expt. Station. Bull. 201. 84 p.

HEMIPTERA

BROOKS, A. R. and L. A. KELTON. 1967. *Aquatic and Semiaquatic Heteroptera of Alberta, Saskatchewan, and Manitoba (Hemiptera).* Memoirs. Ent. Soc. Canada No. 51. 92 p.

SOUTHWOOD, T. R. E. and D. LESTON. 1959. *The land and water bugs of the British Isles.* Warne and Co., London and New York. 436 p.

MEGALOPTERA

LEHMKUHL, D. M. 1975. *Alderflies.* Blue Jay 33: 152-154.

NEUROPTERA

PARFIN, S. I. and A. B. GURNEY. 1956. *The Spongilla-flies.* Proc. U.S. Natl. Museum 105: 421-529. (No. 3360).

TRICHOPTERA

ROSS, H. H. 1944. *The caddis flies, or Trichoptera, of Illinois.* Bull. Illinois. Nat. Hist. Surv. 23: 1-326.

LEPIDOPTERA

LANGE, W. H. Jr. 1963. *Aquatic Lepidoptera* In: Usinger, R. L., *Aquatic Insects of California.* p. 271-288. U. of California Press.

COLEOPTERA

HATCH, M. H. 1953. *The beetles of the Pacific Northwest. Part I. Introduction and Adephaga.* Univ. Washington Publ. Biol. 340 p.

LARSON, D. J. 1975. *The Predaceous Water Beetles* (Coleoptera: Dytiscidae) *of Alberta: Systematics, Natural History and Distribution.* Quaestiones Entomologica 11: 245-498.

DIPTERA

CARPENTER, S. J. and W. J. LaCASSE. 1955. *Mosquitoes of North America.* U. of California Press. 360 p.

COOK, E. F. 1956. *The Nearctic Chaoborinae* (Diptera: Culcidae). U. of Minnesota Ag. Expt. Station. Bull. 218. 102 p.

JOHANNSEN, O. A. 1934-1938. *Aquatic Diptera, Parts I-V.* Cornell Univ. Ag. Expt. Station (recently reprinted in a single volume).

REMPEL, J. G. 1950. *A guide to the mosquito larvae of Western Canada.* Can. J. Res. D, 28: 207-248.

REMPEL, J. G. 1953. *The Mosquitoes of Saskatchewan.* Can. J. Zool. 31: 433-509.

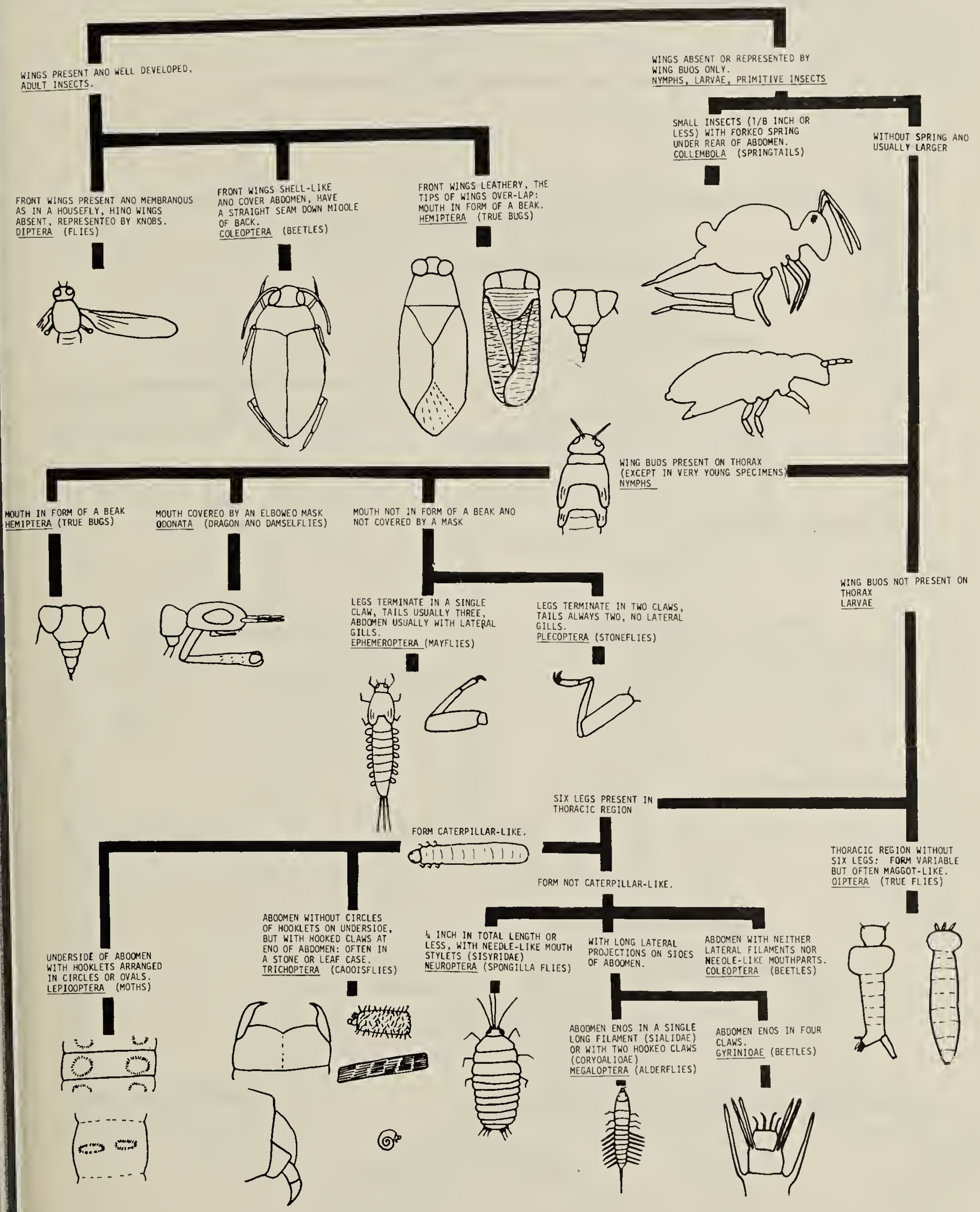
OTHER

BOUSQUET, W. S. 1975. *Photographing Aquatic Insects.* TIEG Newsletter 10: 13-19. (TIEG Editor, 315 Plant Science Bldg., Cornell University, Ithaca, New York. 14853. U.S.A. TIEG stands for Teen International Entomology Group).

DRIVER, E. A. 1974. *Insects Invade an Urban Pond.* Blue Jay 32: 27-32.

TONES, Patricia. 1970. *Pollution in the North Saskatchewan River.* Blue Jay 28: 111-113.

KEY TO THE ORDERS OF INSECTS FOUND IN OR ON WATER



WINGS PRESENT AND WELL DEVELOPED.
ADULT INSECTS.

FRONT WINGS PRESENT AND MEMBRANOUS AS IN A HOUSEFLY, HIND WINGS ABSENT, REPRESENTED BY KNOBS.
DIPTERA (FLIES)

FRONT WINGS SHELL-LIKE AND COVER ABDOMEN, HAVE A STRAIGHT SEAM DOWN MIDDLE OF BACK.
COLEOPTERA (BEETLES)

FRONT WINGS LEATHERY, THE TIPS OF WINGS OVER-LAP: MOUTH IN FORM OF A BEAK.
HEMIPTERA (TRUE BUGS)

WINGS ABSENT OR REPRESENTED BY WING BUDS ONLY.
NYMPHS, LARVAE, PRIMITIVE INSECTS

SMALL INSECTS (1/8 INCH OR LESS) WITH FORKED SPRING UNDER REAR OF ABDOMEN.
COLLEMBOLA (SPRINGTAILS)

WITHOUT SPRING AND USUALLY LARGER

WING BUDS PRESENT ON THORAX (EXCEPT IN VERY YOUNG SPECIMENS)
NYMPHS

MOUTH IN FORM OF A BEAK
HEMIPTERA (TRUE BUGS)

MOUTH COVERED BY AN ELBOWED MASK
ODONATA (DRAGON AND DAMSELFLIES)

MOUTH NOT IN FORM OF A BEAK AND NOT COVERED BY A MASK

LEGS TERMINATE IN A SINGLE CLAW, TAILS USUALLY THREE, ABDOMEN USUALLY WITH LATERAL GILLS.
EPHEMEROPTERA (MAYFLIES)

LEGS TERMINATE IN TWO CLAWS, TAILS ALWAYS TWO, NO LATERAL GILLS.
PLECOPTERA (STONEFLIES)

WING BUDS NOT PRESENT ON THORAX
LARVAE

SIX LEGS PRESENT IN THORACIC REGION

FORM CATERPILLAR-LIKE.

UNDERSIDE OF ABDOMEN WITH HOOKLETS ARRANGED IN CIRCLES OR OVALS.
LEPIDOPTERA (MOTHS)

ABDOMEN WITHOUT CIRCLES OF HOOKLETS ON UNDERSIDE, BUT WITH HOOKED CLAWS AT END OF ABDOMEN: OFTEN IN A STONE OR LEAF CASE.
TRICHOPTERA (CADDISFLIES)

FORM NOT CATERPILLAR-LIKE.

¼ INCH IN TOTAL LENGTH OR LESS, WITH NEEDLE-LIKE MOUTH STYLETS (SISYRIDAE)
NEUROPTERA (SPONGILLA FLIES)

WITH LONG LATERAL PROJECTIONS ON SIDES OF ABDOMEN.

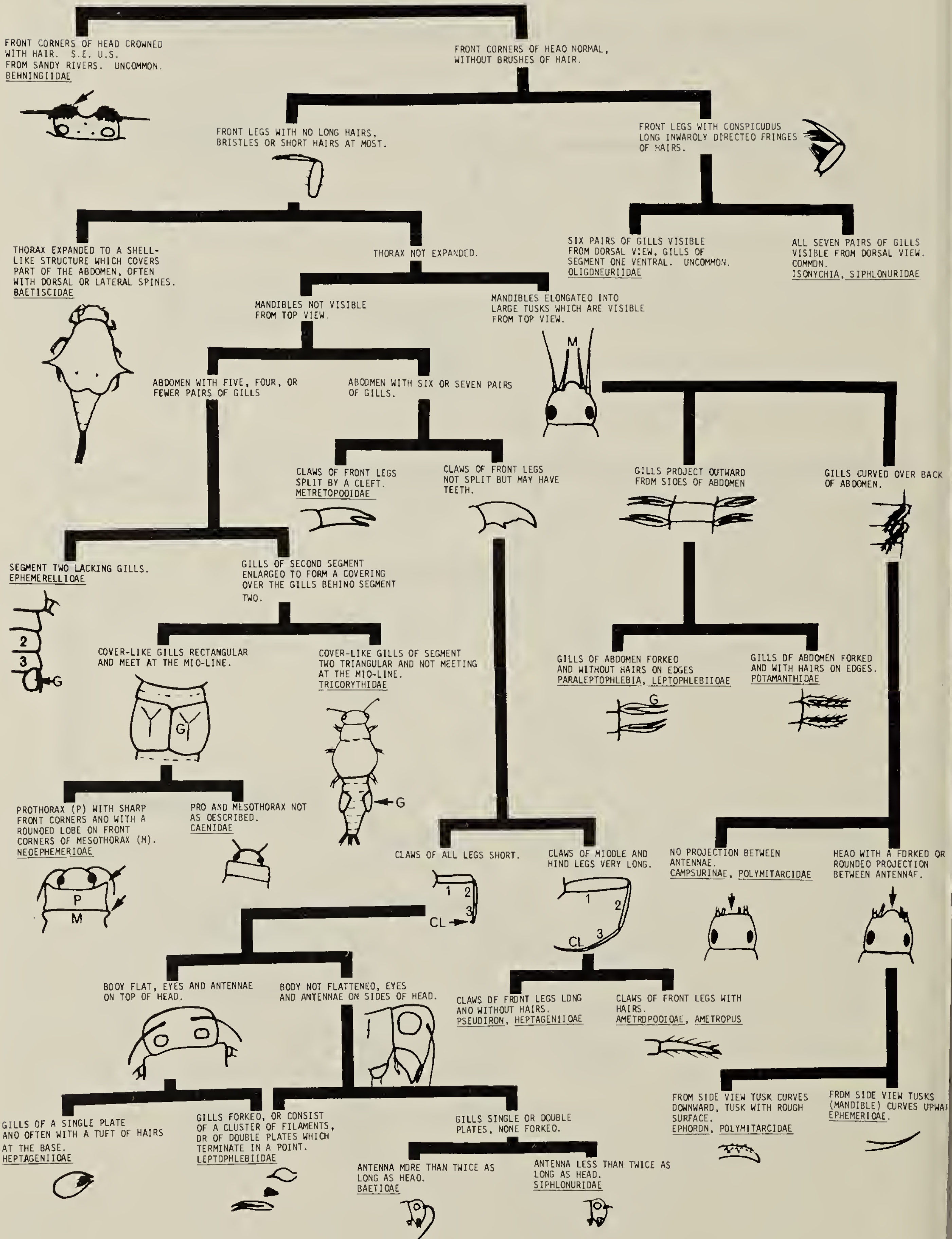
ABDOMEN ENDS IN A SINGLE LONG FILAMENT (SIALIDAE) OR WITH TWO HOOKED CLAWS (CORYDALIDAE)
MEGALOPTERA (ALDERFLIES)

ABDOMEN ENDS IN FOUR CLAWS.
GYRINIDAE (BEETLES)

ABDOMEN WITH NEITHER LATERAL FILAMENTS NOR NEEDLE-LIKE MOUTHPARTS.
COLEOPTERA (BEETLES)

THORACIC REGION WITHOUT SIX LEGS: FORM VARIABLE BUT OFTEN MAGGOT-LIKE.
DIPTERA (TRUE FLIES)

KEY TO THE FAMILIES OF EPHEMEROPTERA NYMPHS



FRONT CORNERS OF HEAD CROWNED WITH HAIR. S.E. U.S. FROM SANDY RIVERS. UNCOMMON. BEHNINGIIDAE

FRONT CORNERS OF HEAD NORMAL, WITHOUT BRUSHES OF HAIR.

FRONT LEGS WITH NO LONG HAIRS, BRISTLES OR SHORT HAIRS AT MOST.

FRONT LEGS WITH CONSPICUOUS LONG INWARDLY DIRECTED FRINGES OF HAIRS.

THORAX EXPANDED TO A SHELL-LIKE STRUCTURE WHICH COVERS PART OF THE ABDOMEN, OFTEN WITH DORSAL OR LATERAL SPINES. BAETISCIDAE

THORAX NOT EXPANDED.

SIX PAIRS OF GILLS VISIBLE FROM DORSAL VIEW, GILLS OF SEGMENT ONE VENTRAL. UNCOMMON. OLIGONEURIIDAE

ALL SEVEN PAIRS OF GILLS VISIBLE FROM DORSAL VIEW. COMMON. ISONYCHIA, SIPHLONURIDAE

MANDIBLES NOT VISIBLE FROM TOP VIEW.

MANDIBLES ELONGATED INTO LARGE TUSKS WHICH ARE VISIBLE FROM TOP VIEW.

ABDOMEN WITH FIVE, FOUR, OR FEWER PAIRS OF GILLS

ABDOMEN WITH SIX OR SEVEN PAIRS OF GILLS.

CLAWS OF FRONT LEGS SPLIT BY A CLEFT. METRETOPODIDAE

CLAWS OF FRONT LEGS NOT SPLIT BUT MAY HAVE TEETH.

GILLS PROJECT OUTWARD FROM SIDES OF ABDOMEN

GILLS CURVED OVER BACK OF ABDOMEN.

SEGMENT TWO LACKING GILLS. EPHEMERELLIDAE

GILLS OF SECOND SEGMENT ENLARGED TO FORM A COVERING OVER THE GILLS BEHIND SEGMENT TWO.

COVER-LIKE GILLS RECTANGULAR AND MEET AT THE MID-LINE.

COVER-LIKE GILLS OF SEGMENT TWO TRIANGULAR AND NOT MEETING AT THE MID-LINE. TRICORYTHIDAE

GILLS OF ABDOMEN FORKED AND WITHOUT HAIRS ON EDGES PARALEPTOPHLEBIA, LEPTOPHLEBIIDAE

GILLS OF ABDOMEN FORKED AND WITH HAIRS ON EDGES. POTAMANTHIDAE

PROTHORAX (P) WITH SHARP FRONT CORNERS AND WITH A ROUNDED LOBE ON FRONT CORNERS OF MESOTHORAX (M). NEOEPHEMERIDAE

PRO AND MESOTHORAX NOT AS DESCRIBED. CAENIDAE

CLAWS OF ALL LEGS SHORT.

CLAWS OF MIDDLE AND HIND LEGS VERY LONG.

NO PROJECTION BETWEEN ANTENNAE. CAMPSURINAE, POLYMITARCIDAE

HEAD WITH A FORKED OR ROUNDED PROJECTION BETWEEN ANTENNAE.

BODY FLAT, EYES AND ANTENNAE ON TOP OF HEAD.

BODY NOT FLATTENED, EYES AND ANTENNAE ON SIDES OF HEAD.

CLAWS OF FRONT LEGS LONG AND WITHOUT HAIRS. PSEUDIRON, HEPTAGENIIDAE

CLAWS OF FRONT LEGS WITH HAIRS. AMETROPODIDAE, AMETROPUS

GILLS OF A SINGLE PLATE AND OFTEN WITH A TUFT OF HAIRS AT THE BASE. HEPTAGENIIDAE

GILLS FORKED, OR CONSIST OF A CLUSTER OF FILAMENTS, OR OF DOUBLE PLATES WHICH TERMINATE IN A POINT. LEPTOPHLEBIIDAE

GILLS SINGLE OR DOUBLE PLATES, NONE FORKED.

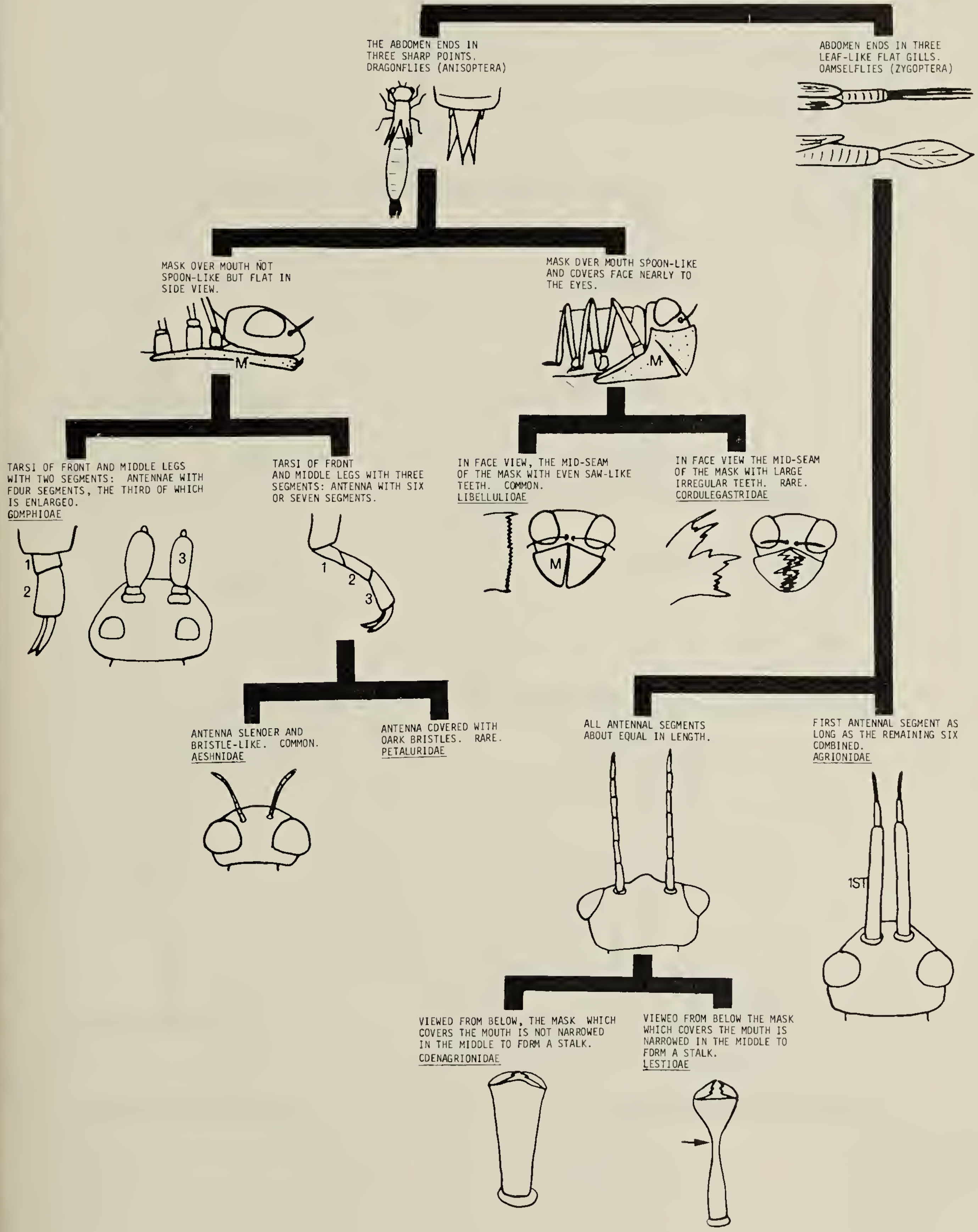
FROM SIDE VIEW TUSK CURVES DOWNWARD, TUSK WITH ROUGH SURFACE. EPHORON, POLYMITARCIDAE

FROM SIDE VIEW TUSKS (MANDIBLE) CURVES UPWAR EPHEMERIDAE.

ANTENNA MORE THAN TWICE AS LONG AS HEAD. BAETIDAE

ANTENNA LESS THAN TWICE AS LONG AS HEAD. SIPHLONURIDAE

KEY TO THE FAMILIES OF ODONATA
(IMMATURE STAGES)



THE ABDOMEN ENDS IN THREE SHARP POINTS. DRAGONFLIES (ANISOPTERA)

ABDOMEN ENDS IN THREE LEAF-LIKE FLAT GILLS. DAMSELFLIES (ZYGOPTERA)

MASK OVER MOUTH NOT SPOON-LIKE BUT FLAT IN SIDE VIEW.

MASK OVER MOUTH SPOON-LIKE AND COVERS FACE NEARLY TO THE EYES.

TARSI OF FRONT AND MIDDLE LEGS WITH TWO SEGMENTS: ANTENNAE WITH FOUR SEGMENTS, THE THIRD OF WHICH IS ENLARGED.
GOMPHIDAE

TARSI OF FRONT AND MIDDLE LEGS WITH THREE SEGMENTS: ANTENNA WITH SIX OR SEVEN SEGMENTS.

IN FACE VIEW, THE MID-SEAM OF THE MASK WITH EVEN SAW-LIKE TEETH. COMMON.
LIBELLULIDAE

IN FACE VIEW THE MID-SEAM OF THE MASK WITH LARGE IRREGULAR TEETH. RARE.
CORDULEGASTRIDAE

ANTENNA SLENDER AND BRISTLE-LIKE. COMMON.
AESHNIDAE

ANTENNA COVERED WITH DARK BRISTLES. RARE.
PETALURIDAE

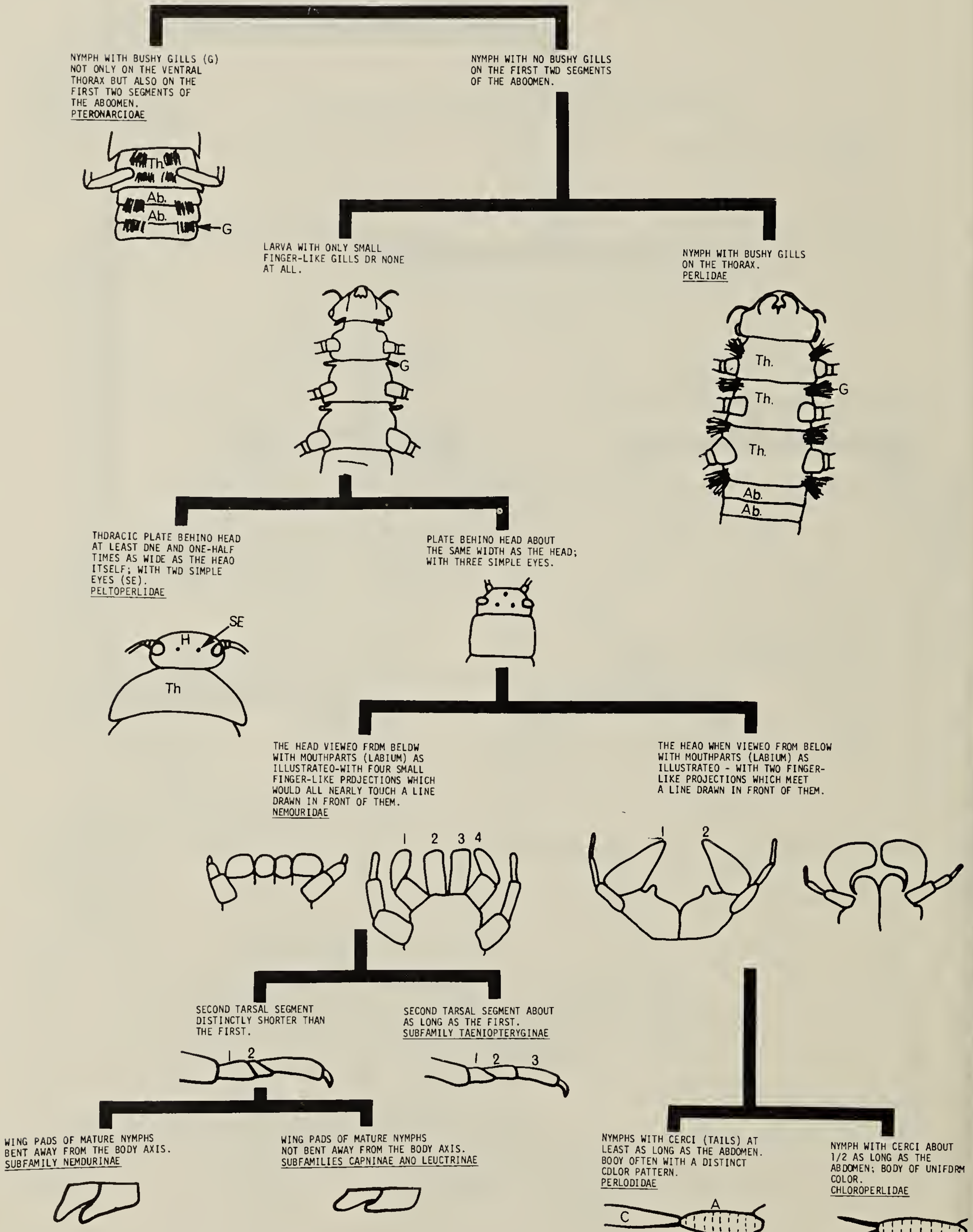
ALL ANTENNAL SEGMENTS ABOUT EQUAL IN LENGTH.

FIRST ANTENNAL SEGMENT AS LONG AS THE REMAINING SIX COMBINED.
AGRIONIDAE

VIEWED FROM BELOW, THE MASK WHICH COVERS THE MOUTH IS NOT NARROWED IN THE MIDDLE TO FORM A STALK.
COENAGRIONIDAE

VIEWED FROM BELOW THE MASK WHICH COVERS THE MOUTH IS NARROWED IN THE MIDDLE TO FORM A STALK.
LESTIDAE

KEY TO THE FAMILIES OF PLECOPTERA NYMPHS


NYMPH WITH BUSHY GILLS (G) NOT ONLY ON THE VENTRAL THORAX BUT ALSO ON THE FIRST TWO SEGMENTS OF THE ABDOMEN.
PTERONARCIDAE

NYMPH WITH NO BUSHY GILLS ON THE FIRST TWO SEGMENTS OF THE ABDOMEN.

LARVA WITH ONLY SMALL FINGER-LIKE GILLS OR NONE AT ALL.

NYMPH WITH BUSHY GILLS ON THE THORAX.
PERLIDAE

THORACIC PLATE BEHIND HEAD AT LEAST ONE AND ONE-HALF TIMES AS WIDE AS THE HEAD ITSELF; WITH TWO SIMPLE EYES (SE).
PELTOPERLIDAE

PLATE BEHIND HEAD ABOUT THE SAME WIDTH AS THE HEAD; WITH THREE SIMPLE EYES.

THE HEAD VIEWED FROM BELOW WITH MOUTHPARTS (LABIUM) AS ILLUSTRATED-WITH FOUR SMALL FINGER-LIKE PROJECTIONS WHICH WOULD ALL NEARLY TOUCH A LINE DRAWN IN FRONT OF THEM.
NEMOURIDAE

THE HEAD WHEN VIEWED FROM BELOW WITH MOUTHPARTS (LABIUM) AS ILLUSTRATED - WITH TWO FINGER-LIKE PROJECTIONS WHICH MEET A LINE DRAWN IN FRONT OF THEM.

SECOND TARSAL SEGMENT DISTINCTLY SHORTER THAN THE FIRST.

SECOND TARSAL SEGMENT ABOUT AS LONG AS THE FIRST.
SUBFAMILY TAENIOPTERYGINAE

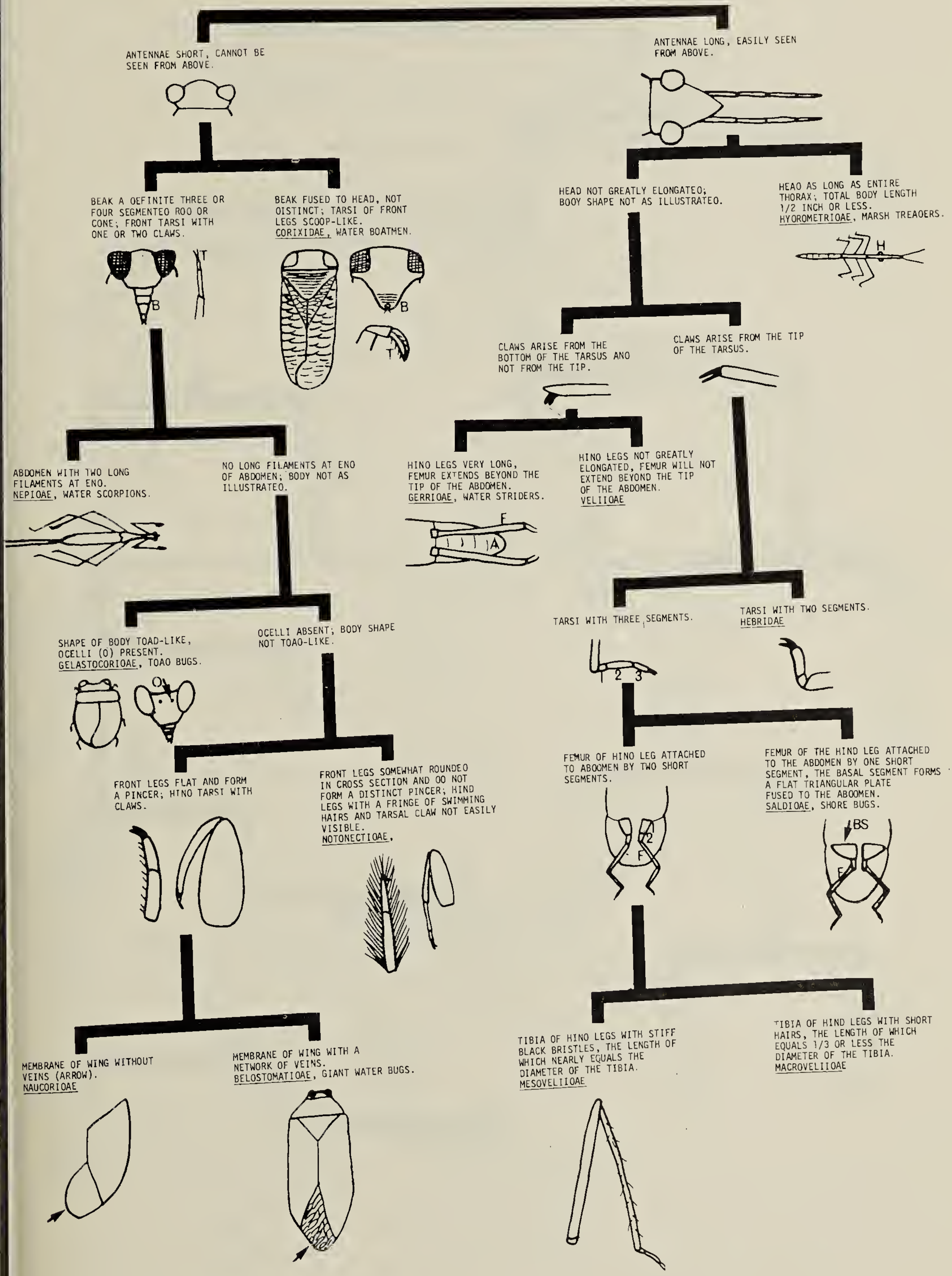
WING PADS OF MATURE NYMPHS BENT AWAY FROM THE BODY AXIS.
SUBFAMILY NEMOURINAE

WING PADS OF MATURE NYMPHS NOT BENT AWAY FROM THE BODY AXIS.
SUBFAMILIES CAPNINAE AND LEUCTRINAE

NYMPHS WITH CERCI (TAILS) AT LEAST AS LONG AS THE ABDOMEN. BODY OFTEN WITH A DISTINCT COLOR PATTERN.
PERLODIDAE

NYMPH WITH CERCI ABOUT 1/2 AS LONG AS THE ABDOMEN; BODY OF UNIFORM COLOR.
CHLOROPERLIDAE

KEY TO THE COMMON FAMILIES OF AQUATIC HEMIPTERA



ANTENNAE SHORT, CANNOT BE SEEN FROM ABOVE.

BEAK A DEFINITE THREE OR FOUR SEGMENTED ROD OR CONE; FRONT TARSI WITH ONE OR TWO CLAWS.

BEAK FUSED TO HEAD, NOT DISTINCT; TARSI OF FRONT LEGS SCOOP-LIKE. CORIXIDAE, WATER BOATMEN.

ABDOMEN WITH TWO LONG FILAMENTS AT END. NEPIDAE, WATER SCORPIONS.

NO LONG FILAMENTS AT END OF ABDOMEN; BODY NOT AS ILLUSTRATED.

SHAPE OF BODY TOAD-LIKE, OCELLI (O) PRESENT. GELASTOCORIDAE, TOAD BUGS.

OCELLI ABSENT; BODY SHAPE NOT TOAD-LIKE.

FRONT LEGS FLAT AND FORM A PINCER; HIND TARSI WITH CLAWS.

FRONT LEGS SOMEWHAT ROUNDED IN CROSS SECTION AND DO NOT FORM A DISTINCT PINCER; HIND LEGS WITH A FRINGE OF SWIMMING HAIRS AND TARSAL CLAW NOT EASILY VISIBLE. NOTONECTIDAE.

MEMBRANE OF WING WITHOUT VEINS (ARROW). NAUCORIDAE

MEMBRANE OF WING WITH A NETWORK OF VEINS. BELOSTOMATIDAE, GIANT WATER BUGS.

ANTENNAE LONG, EASILY SEEN FROM ABOVE.

HEAD NOT GREATLY ELONGATED; BODY SHAPE NOT AS ILLUSTRATED.

HEAD AS LONG AS ENTIRE THORAX; TOTAL BODY LENGTH 1/2 INCH OR LESS. HYDROMETRIDAE, MARSH TREADERS.

CLAWS ARISE FROM THE BOTTOM OF THE TARSUS AND NOT FROM THE TIP.

CLAWS ARISE FROM THE TIP OF THE TARSUS.

HIND LEGS VERY LONG, FEMUR EXTENDS BEYOND THE TIP OF THE ABDOMEN. GERRIDAE, WATER STRIDERS.

HIND LEGS NOT GREATLY ELONGATED, FEMUR WILL NOT EXTEND BEYOND THE TIP OF THE ABDOMEN. VELIIDAE

TARSI WITH THREE SEGMENTS.

TARSI WITH TWO SEGMENTS. HEBRIDAE

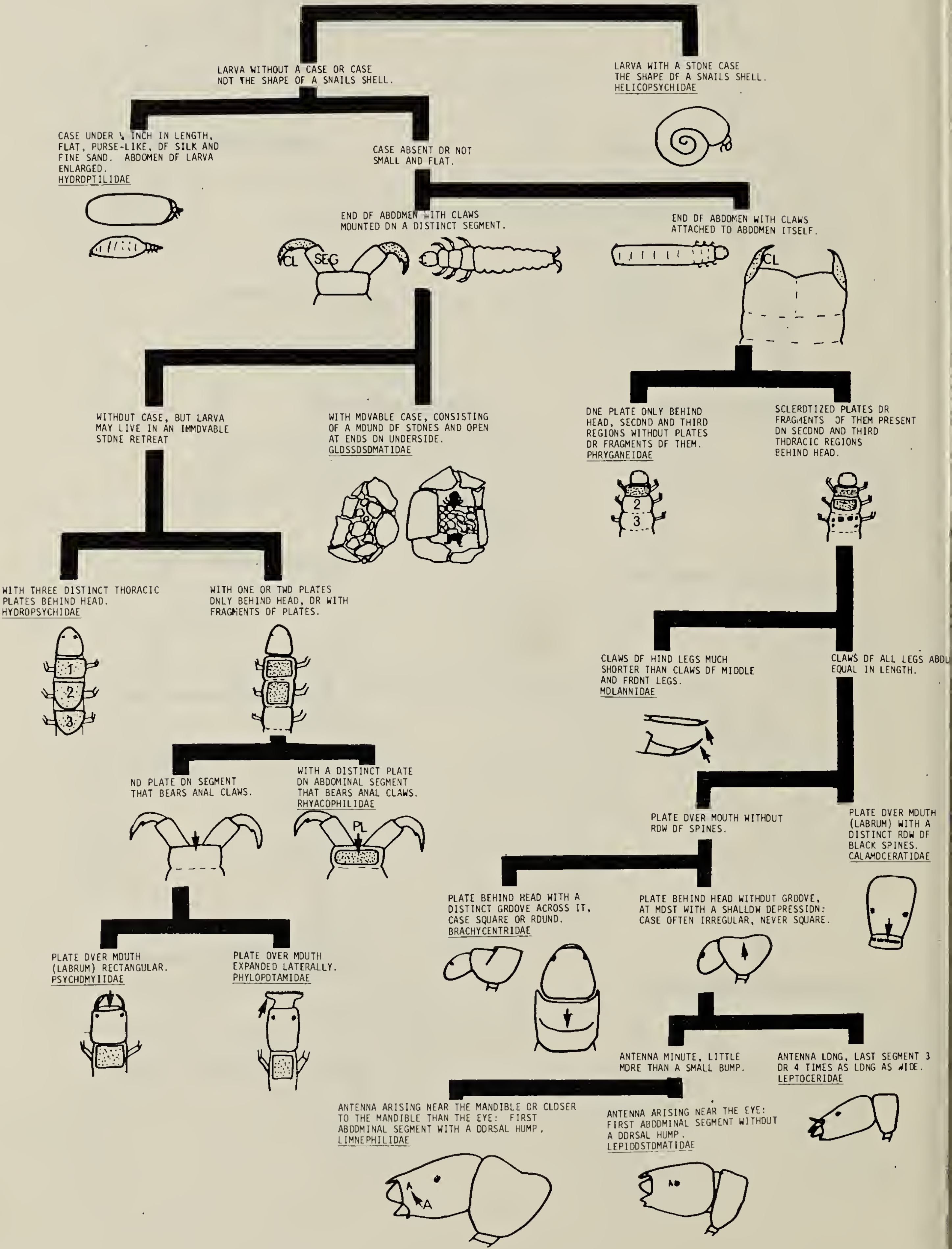
FEMUR OF HIND LEG ATTACHED TO ABDOMEN BY TWO SHORT SEGMENTS.

FEMUR OF THE HIND LEG ATTACHED TO THE ABDOMEN BY ONE SHORT SEGMENT, THE BASAL SEGMENT FORMS A FLAT TRIANGULAR PLATE FUSED TO THE ABDOMEN. SALDIDAE, SHORE BUGS.

TIBIA OF HIND LEGS WITH STIFF BLACK BRISTLES, THE LENGTH OF WHICH NEARLY EQUALS THE DIAMETER OF THE TIBIA. MESOVELIIDAE

TIBIA OF HIND LEGS WITH SHORT HAIRS, THE LENGTH OF WHICH EQUALS 1/3 OR LESS THE DIAMETER OF THE TIBIA. MACROVELIIDAE

KEY TO THE MAJOR FAMILIES OF TRICHOPTERA LARVAE



LARVA WITHOUT A CASE OR CASE NOT THE SHAPE OF A SNAILS SHELL.

LARVA WITH A STONE CASE THE SHAPE OF A SNAILS SHELL.
HELICOPSYCHIDAE

CASE UNDER ¼ INCH IN LENGTH, FLAT, PURSE-LIKE, OF SILK AND FINE SAND. ABDOMEN OF LARVA ENLARGED.
HYDROPTILIDAE

CASE ABSENT OR NOT SMALL AND FLAT.

END OF ABDOMEN WITH CLAWS MOUNTED ON A DISTINCT SEGMENT.

END OF ABDOMEN WITH CLAWS ATTACHED TO ABDOMEN ITSELF.

WITHOUT CASE, BUT LARVA MAY LIVE IN AN IMMOVABLE STONE RETREAT

WITH MOVABLE CASE, CONSISTING OF A MOUND OF STONES AND OPEN AT ENDS ON UNDERSIDE.
GLOSSOSOMATIDAE

ONE PLATE ONLY BEHIND HEAD, SECOND AND THIRD REGIONS WITHOUT PLATES OR FRAGMENTS OF THEM.
PHRYGANEIDAE

SCLEROTIZED PLATES OR FRAGMENTS OF THEM PRESENT ON SECOND AND THIRD THORACIC REGIONS BEHIND HEAD.

WITH THREE DISTINCT THORACIC PLATES BEHIND HEAD.
HYDROPSYCHIDAE

WITH ONE OR TWO PLATES ONLY BEHIND HEAD, OR WITH FRAGMENTS OF PLATES.

CLAWS OF HIND LEGS MUCH SHORTER THAN CLAWS OF MIDDLE AND FRONT LEGS.
MOLANNIDAE

CLAWS OF ALL LEGS ABOU EQUAL IN LENGTH.

NO PLATE ON SEGMENT THAT BEARS ANAL CLAWS.

WITH A DISTINCT PLATE ON ABDOMINAL SEGMENT THAT BEARS ANAL CLAWS.
RHYACOPHILIDAE

PLATE OVER MOUTH WITHOUT ROW OF SPINES.

PLATE OVER MOUTH (LABRUM) WITH A DISTINCT ROW OF BLACK SPINES.
CALAMOCERATIDAE

PLATE OVER MOUTH (LABRUM) RECTANGULAR.
PSYCHOMYIIDAE

PLATE OVER MOUTH EXPANDED LATERALLY.
PHYLOPOTAMIDAE

PLATE BEHIND HEAD WITH A DISTINCT GROOVE ACROSS IT, CASE SQUARE OR ROUND.
BRACHYCENTRIDAE

PLATE BEHIND HEAD WITHOUT GROOVE, AT MOST WITH A SHALLOW DEPRESSION: CASE OFTEN IRREGULAR, NEVER SQUARE.

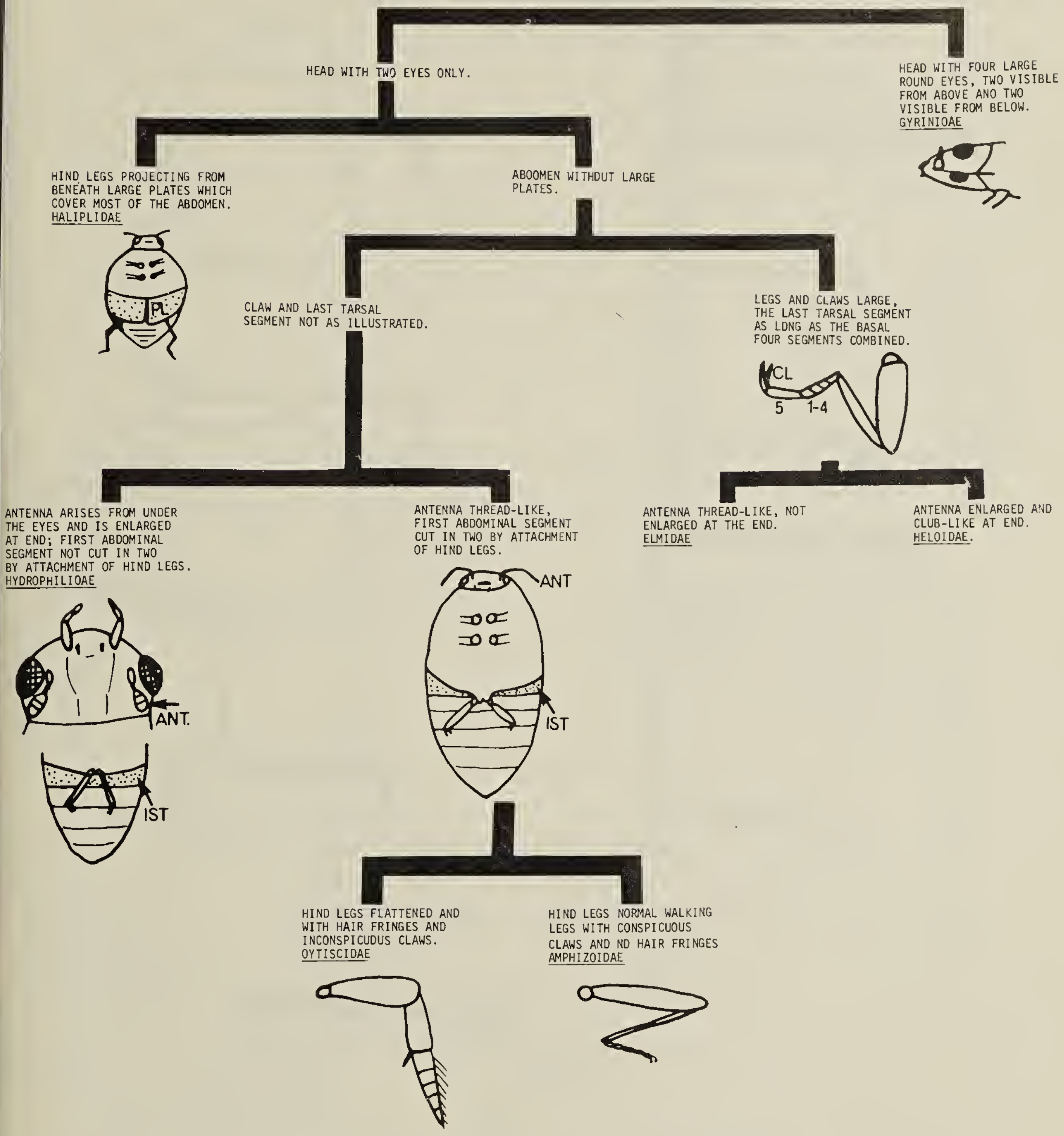
ANTENNA MINUTE, LITTLE MORE THAN A SMALL BUMP.

ANTENNA LONG, LAST SEGMENT 3 OR 4 TIMES AS LONG AS WIDE.
LEPTOCERIDAE

ANTENNA ARISING NEAR THE MANDIBLE OR CLOSER TO THE MANDIBLE THAN THE EYE: FIRST ABDOMINAL SEGMENT WITH A DORSAL HUMP.
LIMNEPHILIDAE

ANTENNA ARISING NEAR THE EYE: FIRST ABDOMINAL SEGMENT WITHOUT A DORSAL HUMP.
LEPIDOSTOMATIDAE

KEY TO THE COMMON FAMILIES OF AQUATIC BEETLES (ADULTS)



HEAD WITH TWO EYES ONLY.

HEAD WITH FOUR LARGE ROUND EYES, TWO VISIBLE FROM ABOVE ANO TWO VISIBLE FROM BELOW.
GYRINIOAE

HIND LEGS PROJECTING FROM BENEATH LARGE PLATES WHICH COVER MOST OF THE ABDOMEN.
HALIPLIDAE

ABOOMEN WITHDUT LARGE PLATES.

CLAW AND LAST TARSAL SEGMENT NOT AS ILLUSTRATED.

LEGS AND CLAWS LARGE, THE LAST TARSAL SEGMENT AS LDNG AS THE BASAL FOUR SEGMENTS COMBINED.

ANTENNA ARISES FROM UNDER THE EYES AND IS ENLARGED AT END; FIRST ABDOMINAL SEGMENT NOT CUT IN TWO BY ATTACHMENT OF HIND LEGS.
HYDROPHILIOAE

ANTENNA THREAD-LIKE, FIRST ABDOMINAL SEGMENT CUT IN TWO BY ATTACHMENT OF HIND LEGS.

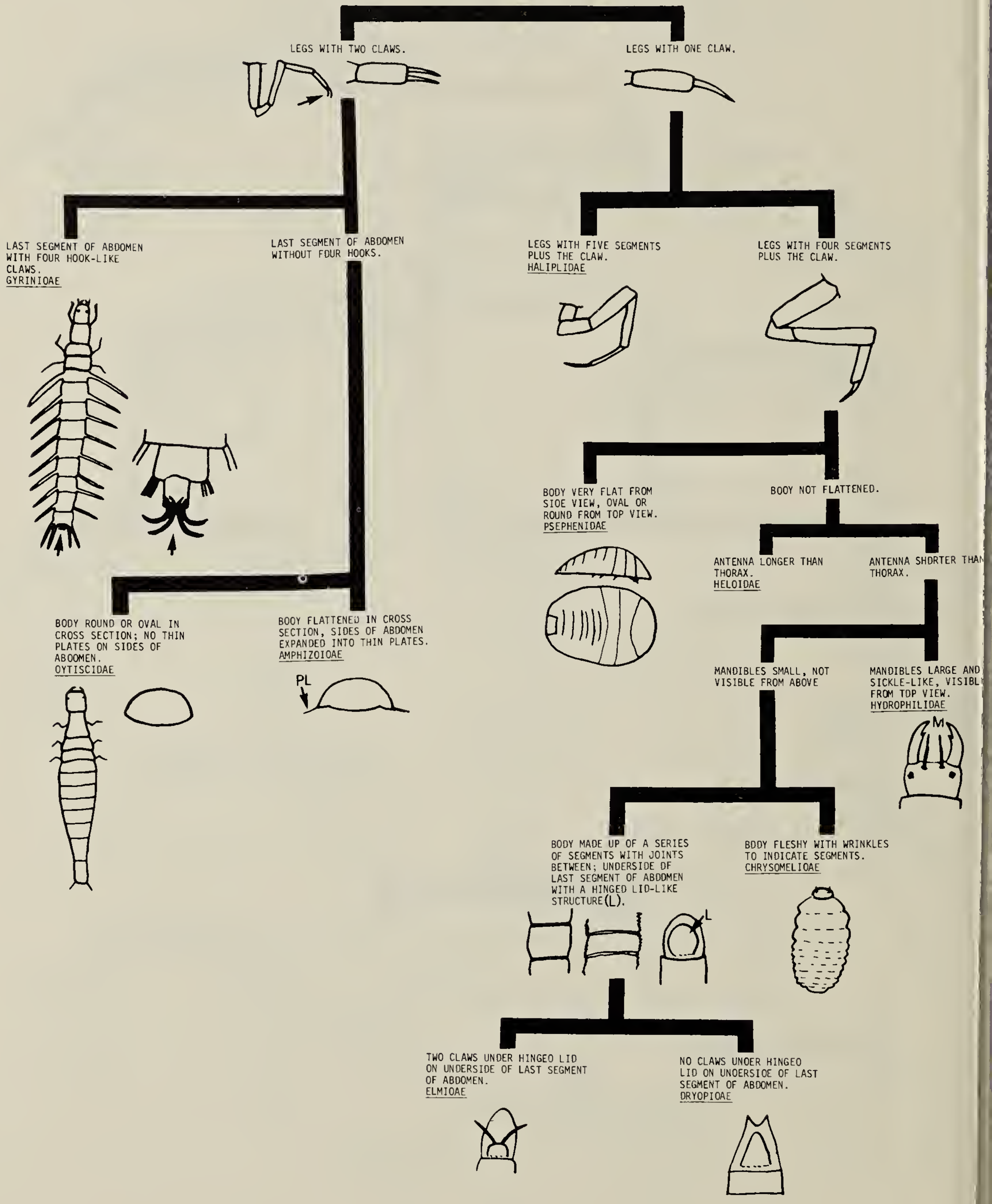
ANTENNA THREAD-LIKE, NOT ENLARGED AT THE END.
ELMIDAE

ANTENNA ENLARGED AND CLUB-LIKE AT END.
HELOIDAE.

HIND LEGS FLATTENED AND WITH HAIR FRINGES AND INCONSPICUDUS CLAWS.
OYTISCIDAE

HIND LEGS NORMAL WALKING LEGS WITH CONSPICUOUS CLAWS AND ND HAIR FRINGES
AMPHIZOIDAE

KEY TO THE COMMON FAMILIES OF AQUATIC BEETLES (LARVAE)



- LEGS WITH TWO CLAWS.
  - LAST SEGMENT OF ABDOMEN WITH FOUR HOOK-LIKE CLAWS. GYRINIDAE
  - LAST SEGMENT OF ABDOMEN WITHOUT FOUR HOOKS.
    - BODY ROUND OR OVAL IN CROSS SECTION; NO THIN PLATES ON SIDES OF ABDOMEN. DYTISCIDAE
    - BODY FLATTENED IN CROSS SECTION, SIDES OF ABDOMEN EXPANDED INTO THIN PLATES. AMPHIZOIDAE
- LEGS WITH ONE CLAW.
  - LEGS WITH FIVE SEGMENTS PLUS THE CLAW. HALIPLIDAE
  - LEGS WITH FOUR SEGMENTS PLUS THE CLAW.
    - BODY VERY FLAT FROM SIDE VIEW, OVAL OR ROUND FROM TOP VIEW. PSEPHENIDAE
    - BODY NOT FLATTENED.
      - ANTENNA LONGER THAN THORAX. HELOIDAE
      - ANTENNA SHORTER THAN THORAX.
        - MANDIBLES SMALL, NOT VISIBLE FROM ABOVE
          - BODY MADE UP OF A SERIES OF SEGMENTS WITH JOINTS BETWEEN; UNDERSIDE OF LAST SEGMENT OF ABDOMEN WITH A HINGED LID-LIKE STRUCTURE(L).
            - TWO CLAWS UNDER HINGED LID ON UNDERSIDE OF LAST SEGMENT OF ABDOMEN. ELMIDAE
            - NO CLAWS UNDER HINGED LID ON UNDERSIDE OF LAST SEGMENT OF ABDOMEN. DRYOPIDAE
          - BODY FLESHY WITH WRINKLES TO INDICATE SEGMENTS. CHRYSOMELIDAE
        - MANDIBLES LARGE AND SICKLE-LIKE, VISIBL FROM TOP VIEW. HYDROPHILIDAE

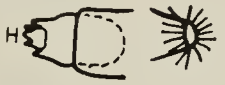
KEY TO THE COMMON FAMILIES OF AQUATIC DIPTERA LARVAE

LARVA WITH A DISTINCT HEAD CAPSULE (H), MOUTHPARTS, AND EYES.

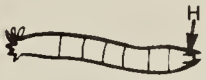
LARVA WITH NO VISIBLE HEAD.

LARVA NOT AS DESCRIBED.

HEAD CAPSULE PARTLY VISIBLE BUT PARTLY WITHDRAWN INTO THORAX: BODY OFTEN COVERED WITH A CHALKY FILM: TIP OF ABDOMEN WITH A TUFT OF HAIRS.
STRATIOMYIIDAE

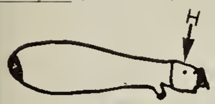


HEAD CAPSULE PRESENT BUT COMPLETELY WITHDRAWN INTO THORAX: HEAD CAPSULE INCOMPLETE POSTERIORLY.
TIPULIDAE



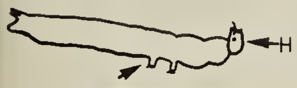
LARVA NOT AS DESCRIBED.

ABDOMEN ENLARGED SO BODY APPEARS CLUB-SHAPED: "FALSE LEG" LOCATED BEHIND HEAD: POSTERIOR END OF BODY WITH A CIRCLE OF HOOKLETS.
SIMULIIDAE (BLACKFLIES)



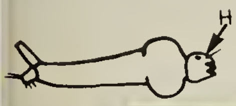
LARVA NOT AS DESCRIBED.

LARVA WITH TWO PAIR OF "FALSE LEGS" BEHIND HEAD.
DIXIDAE



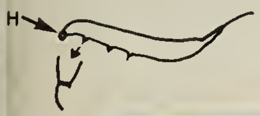
LARVA NOT AS DESCRIBED.

WITH AN ENLARGED AND SWELLED REGION BEHIND HEAD: WITH NO "FALSE LEGS".
CULICIDAE (MOSQUITO FAMILY)



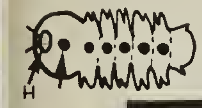
LARVA NOT AS DESCRIBED.

WITH A LONG TUBE AT THE POSTERIOR END AND THREE PAIRS OF HOOKED "FALSE LEGS" BEHIND HEAD.
PTYCHOPTERIDAE



LARVA NOT AS DESCRIBED.

WITH A ROW OF SIX SUCKER-LIKE AREAS DOWN MIDDLE OF UNDERSIDE OF ABDOMEN. FROM MOUNTAIN STREAMS.
BLEPHAROCERIDAE

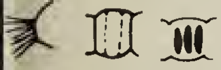


LARVA NOT AS DESCRIBED.

LARVA WITH A FORKED ANTENNA AND SIX PAIRS OF LATERAL "FALSE LEGS"; UNCOMMON, FROM MOUNTAIN STREAMS.
DEUTEROPHLEBIIDAE

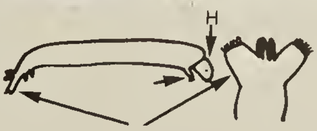
LARVA NOT AS DESCRIBED.

LARVA 1/8 INCH IN LENGTH OR LESS, EACH BODY SEGMENT SUBDIVIDED INTO THREE SUBSEGMENTS: ABDOMEN WITH AN APICAL TUFT OF HAIRS.
PSYCHODIDAE

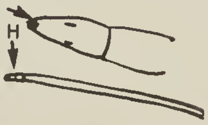


LARVA NOT AS DESCRIBED.

LARVA WITH ONE "FALSE LEG" BEHIND HEAD AND TWO "FALSE LEGS" AT END OF ABDOMEN.
CHIRONOMIDAE

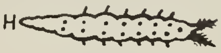


LARVA LONG, NEEDLE-LIKE AND LEGLESS WITH HEAD LONGER THAN WIDE OR WITH A HOOK AT THE POSTERIOR END OR WITH BOTH ANTERIOR AND POSTERIOR "FALSE LEGS" AND WITH DENSE HAIRS ON THE DORSAL SIDE OF THE BODY.
CERATOPOGONIDAE



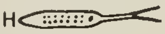
LARVA NOT AS DESCRIBED.

LARVA WITH A FORKED "TAIL" FRINGED WITH HAIRS. FROM STREAMS.
RHAGIONIDAE



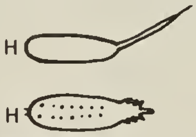
LARVA NOT AS DESCRIBED.

LARVA WITH A FORKED "TAIL" BUT WITHOUT FRINGES OF HAIRS. FROM SALT LAKES.
EPHYDRIDAE



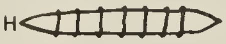
LARVA NOT AS DESCRIBED.

LARVA WITH A SINGLE LONG OR SHORT "TAIL".
SYRPHIDAE

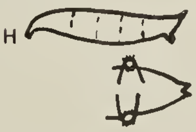


LARVA NOT AS DESCRIBED.

LARVA POINTED AT BOTH ENDS AND WITH A GIRDLE OF "FALSE LEGS" ON EACH SEGMENT.
TABANIDAE



LARVA WITH TWO POINTS AND TWO "FALSE LEGS" ON THE TAIL END.
ANTHOMYIIDAE



LARVA WITH A STAR-LIKE DISK ON THE TAIL END.
SCIOMYZIDAE

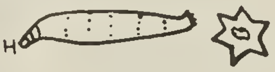


TABLE 1

SOME CHARACTERISTICS OF THE FAMILIES OF NORTH AMERICAN AQUATIC INSECTS

Fig. No.	Orders and Families	Common Name	Prairie Province Distribution[1]	Habitat[2] (Exceptions	Food[3] occur)	Remarks
11,12	**Collembola**	**Springtails**	S,A,M	P	O,H	Surface, cosmopolitan
	Ephemeroptera	**Mayflies**				
1	Ametropodidae		S	R	O,H	Sand bars, Sask. Riv.
	Baetidae	Small Mayflies	S,A,M	R,S,L,P	O,H	Common, widespread
2	Baetiscidae		S,A,M	R	O,H	Sask. Riv., rare northern lakes
3	Behningiidae		—	R	O,H	Sand bars, southeast U.S.
4	Caenidae		S,A,M	P,R	O,H	Common, widespread
5	Ephemerellidae		S,A,M	R,S	O,H	Common, widespread
	Ephemeridae	Burrowing Mayflies	S,A,M	R,L	O,H	Burrowers, large lakes
6	Heptageniidae	Stream Mayflies	S,A,M	R,S	O,H,C	Flat rock clingers
7	Leptophlebiidae		S,A,M	R,S,L,P	O,H	Common, diverse group
	Metretopodidae		S,A?,M	R	O,H	Sask. River
	Neoephemeridae		—?	S?	O,H?	Uncommon in west
8	Oligoneuriidae		S	R	O,H	Saskatchewan River
9	Polymitarcidae		S,A,M	L,R	O,H	Burrowers, large lakes and riv.
	Potamanthidae		—?	R	O,H	Eastern
10	Siphlonuridae		S,A,M	R,P	O,H,C	Common, widespread, diverse
	Tricorythidae		S,A,M	S,R	O,H	Common, widespread
	Odonata	**Dragonflies and Damselflies**				
13	Aeshnidae	Darners	S,A,M	S,P	C	Common, widespread
	Agrionidae	Broad-winged Damselflies	S,A,M	S	C	Common, widespread
14	Coenagrionidae	Narrow-winged Damselflies	S,A,M	P	C	Common, widespread
	Cordulegastridae	Biddies	—?	S	C	Mountain streams
15	Gomphidae	Clubtails	S,A,M	R,S	C	Common, widespread
	Lestidae	Spread-winged Damselflies	S,A,M	P	C	Common, widespread
16	Libellulidae	Common Skimmers	S,A,M	P	C	Common, widespread
	Petaluridae	Graybacks	—	—	C	Rare, bogs
	Plecoptera	**Stoneflies**				
	Chloroperlidae	Green Stoneflies	S,A,M	R,S	C	Common
	Nemouridae	Spring Stoneflies	S,A,M	R,S,P	O,H	Common
	Peltoperlidae	Roachlike Stoneflies	A,M?	S	O,H	Common, mountains
	Perlidae	Common Stoneflies	S,A,M	R,S	C	Common, widespread
21	Perlodidae	Perlodid Stoneflies	S,A,M	R,S	C	Common, widespread
	Pteronarcidae	Giant Stoneflies	S,A,M	R,S	O,H	Common, widespread
	Hemiptera	**True bugs**				
22	Belostomatidae	Giant Water Bugs	S,A,M	P,L,S	C	Very large
23	Corixidae	Water Boatmen	S,A,M	R,S,L,P	O,H,C?	Common, widespread
24	Gelastocoridae	Toad Bugs	M	—	C	Western, on shores
25	Gerridae	Water Striders	S,A,M	—	C	Surface, still water
	Hebridae	Velvet Water Bugs	S,A,M	—	C	Shore debris
26	Hydrometridae	Water Measurers	S,M	P	C	Inconspicuous, 1/2"
27	Macroveliidae		—	—	C	Moss near water
	Mesoveliidae	Water Treaders	S,A,M	—	C	Surface, still water
	Naucoridae	Creeping Water Bugs	—	L,R,P,S	C	Often warm springs
	Nepidae	Water Scorpions	M	P	C	2" long
28	Notonectidae	Back Swimmers	S,A,M	L,P.S	C	Common, widespread
29	Saldidae	Shore Bugs	S,A,M	—	C	Shores
	Veliidae	Ripple Bugs	S,A,M	—	C	Surface, still water
	Megaloptera	**Dobsonflies, Alderflies**				
17	Corydalidae	Hellgrammites, Dobsonflies	M,A	S	C	Cosmopolitan
18	Sialidae	Alderflies	S,A,M	S,P	C	Common, widespread

TABLE 1 (Contd.)

SOME CHARACTERISTICS OF THE FAMILIES OF NORTH AMERICAN AQUATIC INSECTS

Fig. No.	Orders and Families	Common Name	Prairie Province Distribution[1]	Habitat[2] (Exceptions	Food[3] occur)	Remarks
	Neuroptera	**Lacewings**				
19	Sisyridae	Spongillaflies	S,A,M	P,S	C	On freshwater sponges
	Trichoptera	**Caddisflies**				
30	Brachycentridae	Brachycentrids	S,A,M	R,S	O,H	Common, widespread
31	Calamoceratidae	Calamoceratids	—?	S	O,H	Uncommon
	Glossosomatidae		S,A,M	R,S	O,H	Common, widespread
32	Helicopsychidae	Snail-case Caddisflies	S,A,M	R,S,L	O,H	Widespread, warm springs
33	Hydropsychidae	Net-spinning Caddisflies	S,A,M	R,S	O,H	Collect food in net
34	Hydroptilidae	Micro-caddisflies	S,A,M	R,S	O,H	Common, seldom collected
	Lepidostomatidae	Lepidostomatids	S,A,M	R,S	O,H	Fairly common
35	Leptoceridae	Long-horned Caddisflies	S,A,M	R,S,P,L	O,H,C	Diverse family
36	Limnephilidae	Northern Caddisflies	S,A,M	R,S,L,P	O,H	Common, widespread
37	Molannidae	Molannids	S,A,M	L	O,H	Common, northern lakes
	Philopotamidae	Finger-net Caddisflies	S,A,M	R,S	C?	Collect food in net
	Phryganiidae	Large Caddisflies	S,A,M	R,S,L,P	O,H	Common, widespread
	Psychomyiidae	Tube-making Caddisflies	S,A,M,	R,S	O,H,C	Collect food in net
38	Rhyacophilidae	Primitive Caddisflies	S,A,M	R,S	C,O	Mountain streams
	Lepiodoptera	**Moths**				
20	Pyralidae	Pyralid Moths	S,A,M	R,S,L	H	With case on aquatic plants
	Coleoptera	**Beetles**				
39,43	Amphizoidae	Trout-stream Beetles	A	S	C	Rare, mountain streams
40	Chrysomelidae	Leaf Beetles	?	P,L	H	Aquatic leafy plants
	Dryopidae	Long-toed Water Beetles	?	S	O,H	Stream bottoms
41,44	Dytiscidae	Predaceous Diving Beetles	S,A,M	R,S,L,P	C	Common, widespread
42,45	Elmidae	Riffle Beetles	S,A,M	S,P	H	Common, widespread
	Gyrinidae	Whirligig Beetles	S,A,M	S,L,P	C	Common, widespread, surface
	Haliplidae	Crawling Water Beetles	S,A,M	P	O	Common, widespread
	Heloidae	Marsh Beetles	S,A,M	—	O	Damp areas, moss
46	Hydrophilidae	Water Scavenger Beetles	S,A,M	R,S,L,P	O,H	Common, widespread
47	Psephenidae	Water-penny Beetles	—	S	H	Mountain streams
	Diptera	**Flies**				
	Anthomyiidae	Anthomyiid Flies	S,A,M?	P	O,H	Few aquatic species
48	Blephariceridae	Net-winged Midges	A	S	O,H	Mountain streams
49	Ceratopogonidae	Biting Midges	S,A,M	R,S,L,P	C	Common, widespread
50	Chironomidae	Midges	S,A,M	R,S,L,P	O,H,C	Common, widespread
51	Culicidae	Mosquitoes	S,A,M	P	O,H	Any standing water
	Deuterophlebiidae	Mountain Midges	A?	S	O,H	Mountain streams
52	Dixidae	Dixid Midges	S,A,M	P	O,H	Common, widespread
	Ephydridae	Shore Flies	S,A?,M	L	O,H	Salt Lakes
	Psychodidae	Moth Flies	S,A,M	—	O,H	Moist areas
	Ptychopteridae	Phanton Crane Flies	S?,A,M	—	O,H	Moist areas
53	Rhagionidae	Snipe Flies	A	R,S	O,H	Genus *Atherix*
	Sciomyzidae	Marsh Flies	S,A,M	—	C	Prey on snails
	Simuliidae	Black Flies	S,A,M	R,S	O	Common filter feeder
54	Stratiomyidae	Soldier Flies	S,A,M	S	O	Seldom collected
	Syrphidae	Flower Flies	S,A,M	P	O	Rat-tailed maggots
55	Tabanidae	Deer and Horse Flies	S,A,M	P	O	
56	Tipulidae	Crane Flies	S,A,M	R,S,L,P	O	Common, widespread

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[1] S-Saskatchewan
A-Alberta
M-Manitoba
—Absent

[2] R-Rivers
S-Streams
L-Lakes
P-Ponds

[3] O-Omnivorous
H-Herbivorous
C-Carnivorous

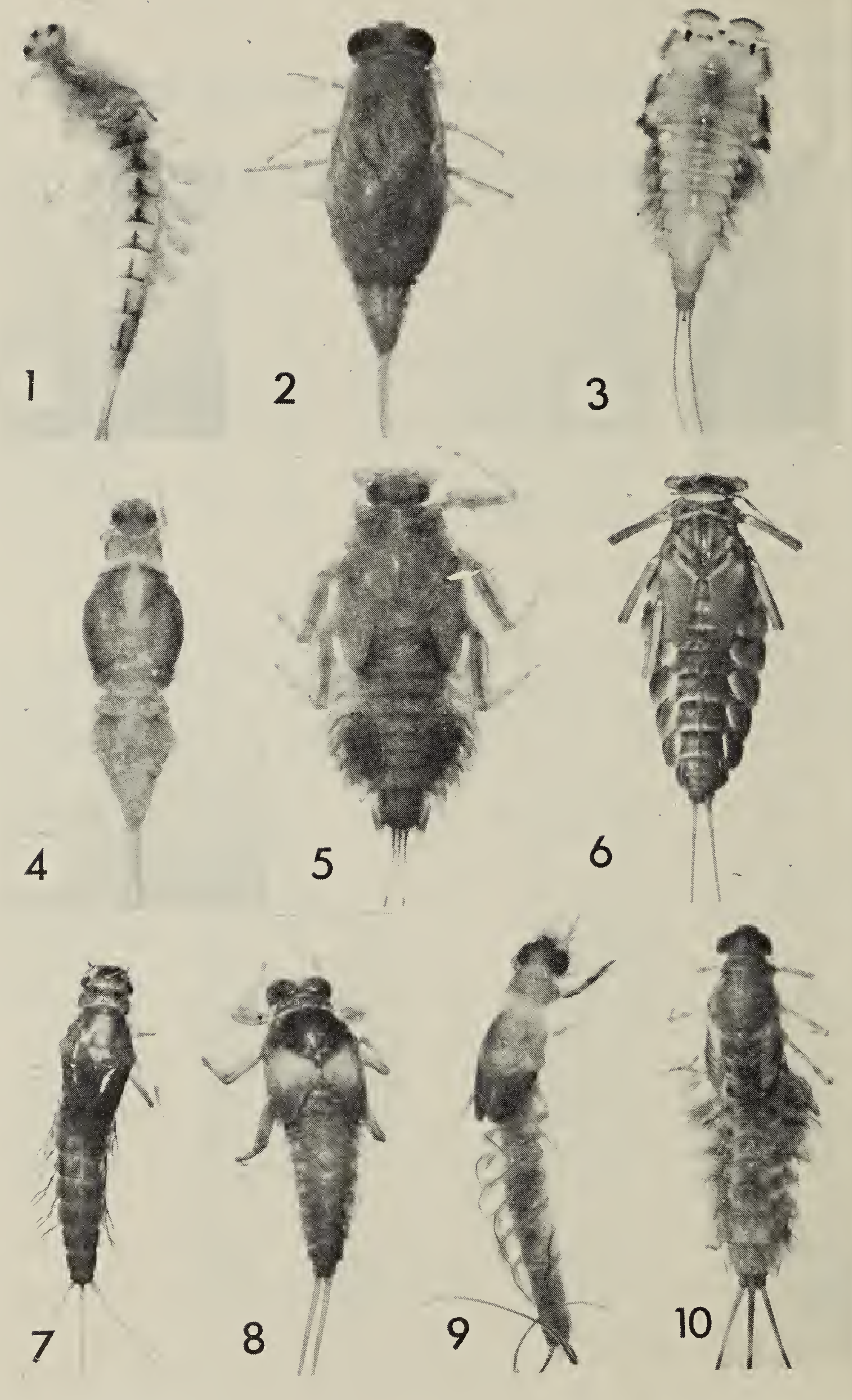


Plate 1. Ephemeroptera
Fig. 1 Ametropodidae; Fig. 2 Baetiscidae; Fig. 3 Behningiidae; Fig. 4 Caenidae; Fig.
Ephemerellidae; Fig. 6 Heptageniidae; Fig. 7 Leptophlebiidae; Fig. 8 Oligoneuriida
Fig. 9 Polymitarcidae; Fig. 10 Siphlonuridae.

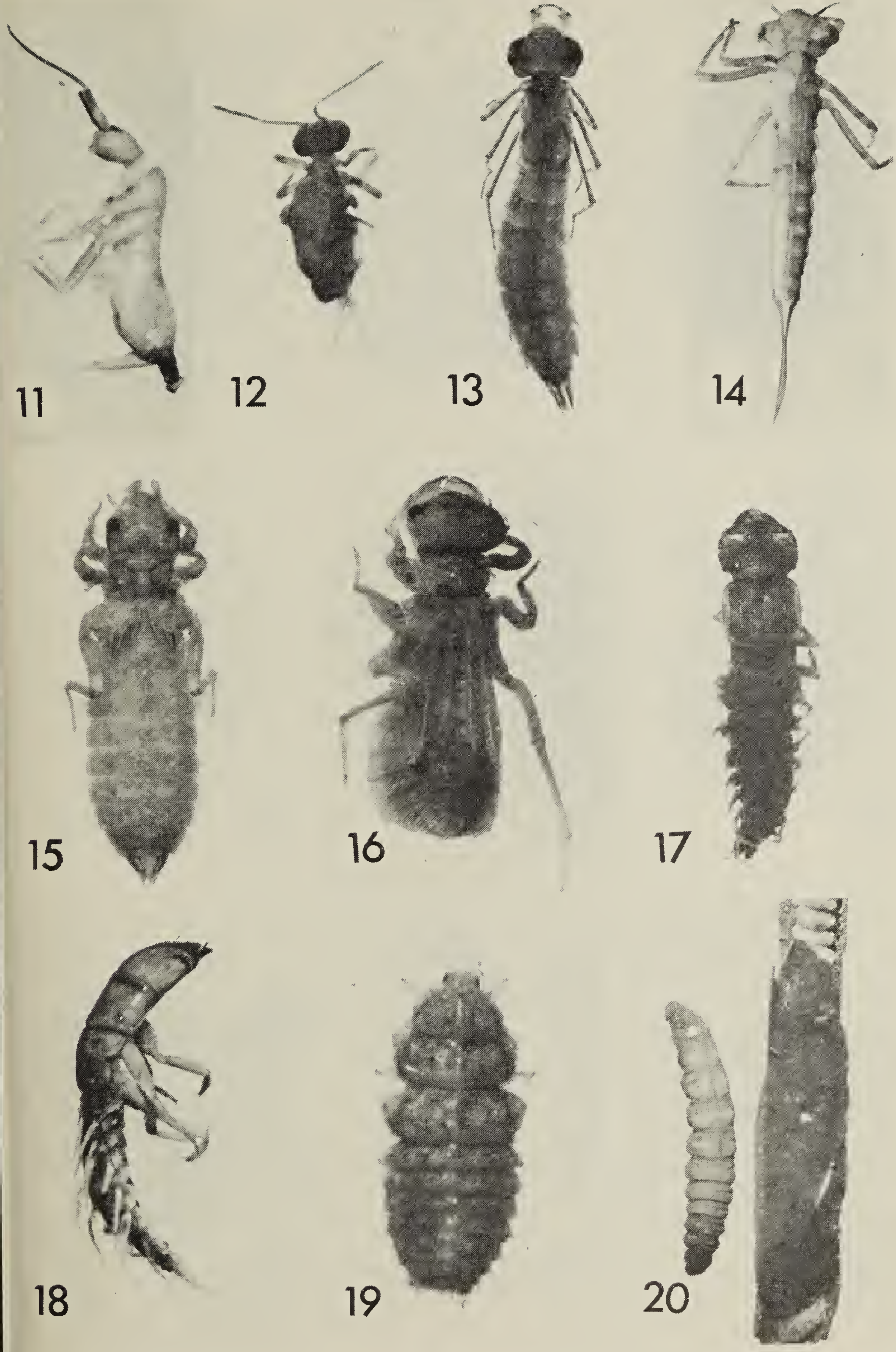
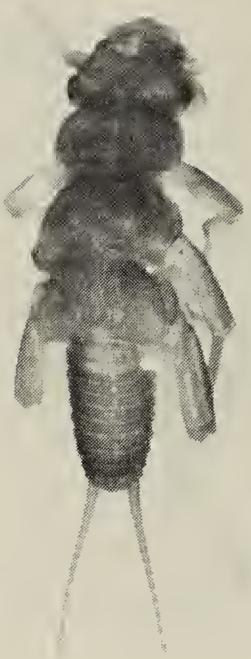


Plate 2. Collembola, Odonata, Megaloptera, Neuroptera and Lepidoptera
Figs. 11 and 12 Collembola; Fig. 13 Aeshnidae; Fig. 14 Coenagrionidae; Fig. 15 Gomphidae; Fig. 16 Libellulidae; Fig. 17 Corydalidae; Fig. 18 Sialidae; Fig. 19 Sisyridae; Fig. 20 Pyralidae.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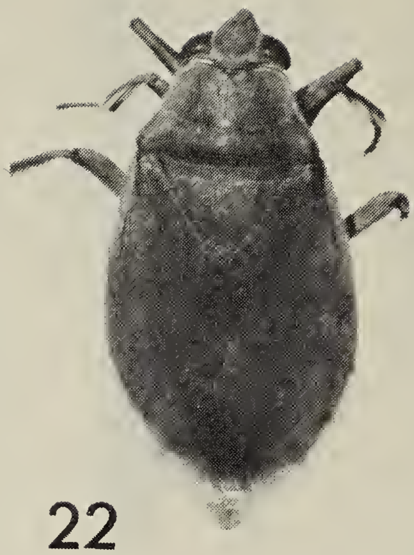
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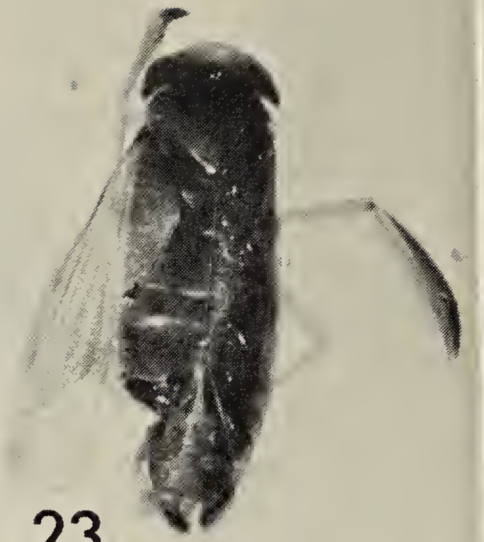
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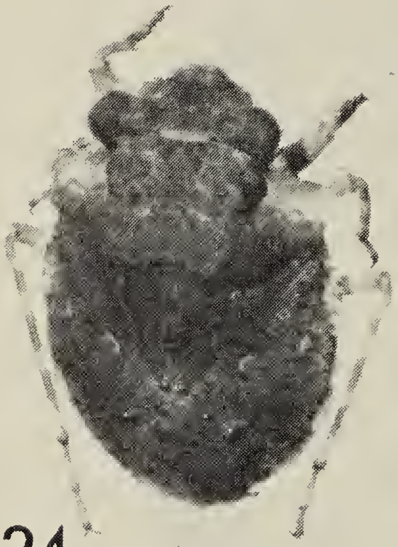
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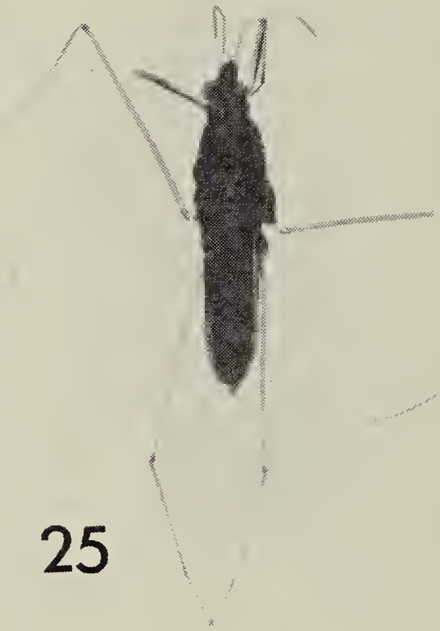
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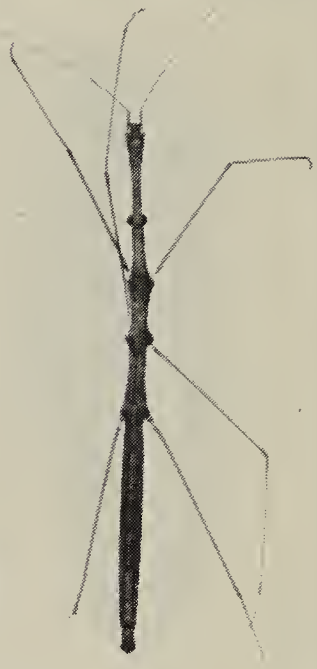
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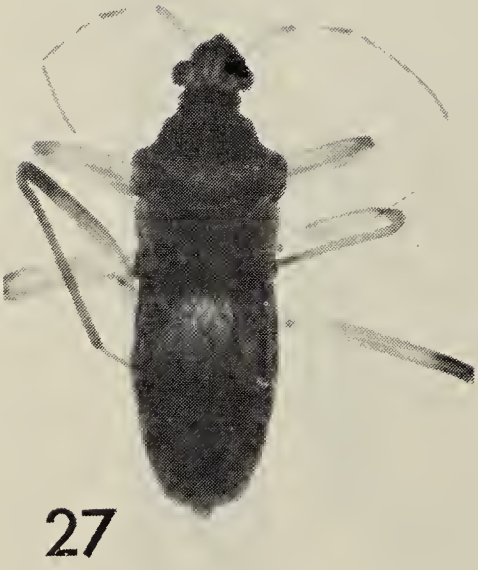
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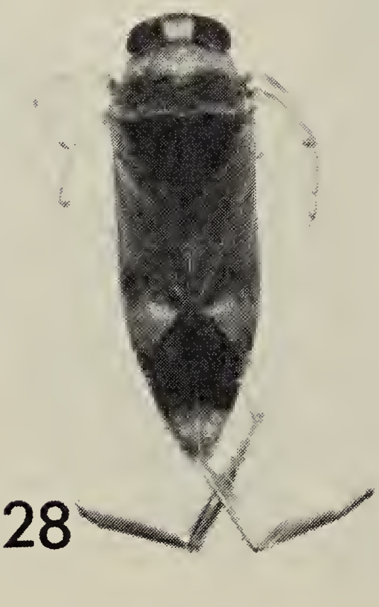
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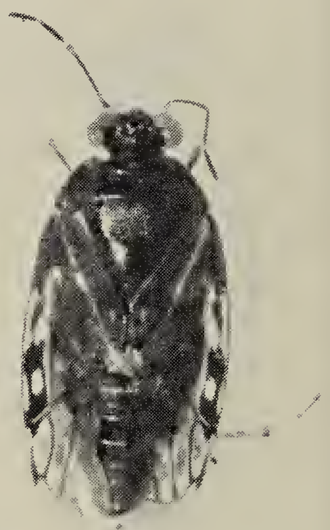
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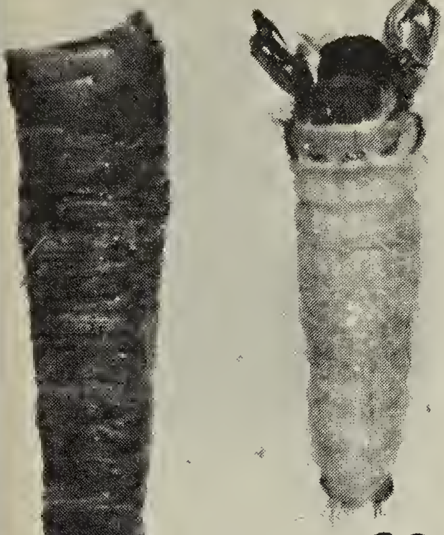
Plate 3. Plecoptera and Hemiptera

Fig. 21 Perlodidae; Fig. 22 Belostomatidae; Fig. 23 Corixidae; Fig. 24 Gelastocorida
Fig. 25 Gerridae; Fig. 26 Hydrometridae; Fig. 27 Macroveliidae; Fig. 28 Notone
tidae; Fig. 29 Saldidae.



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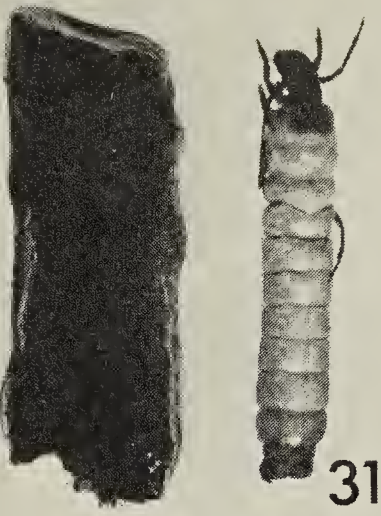

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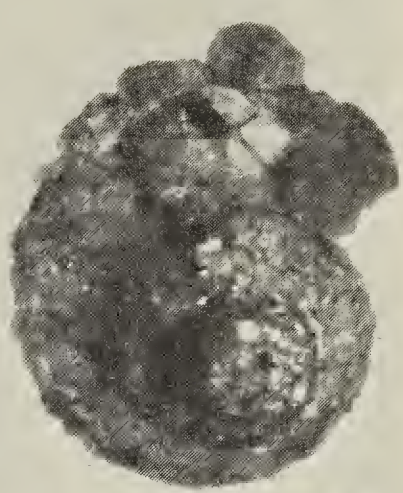

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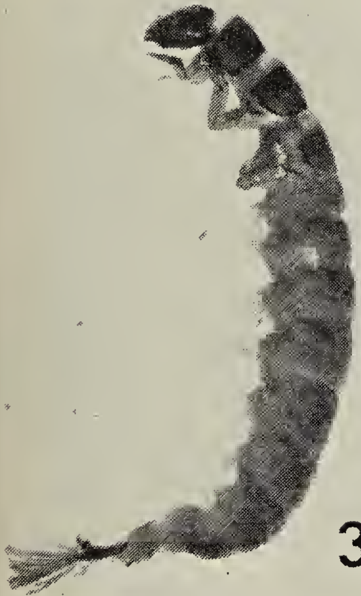

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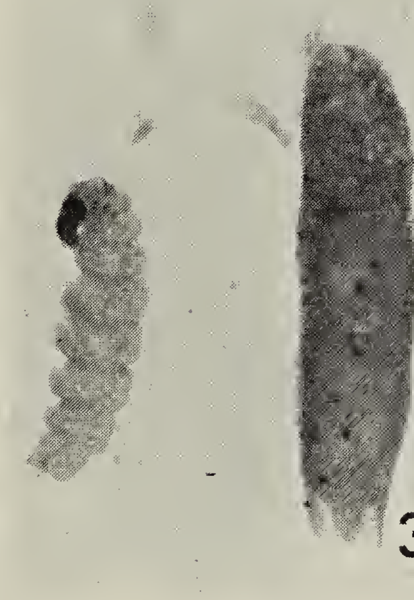

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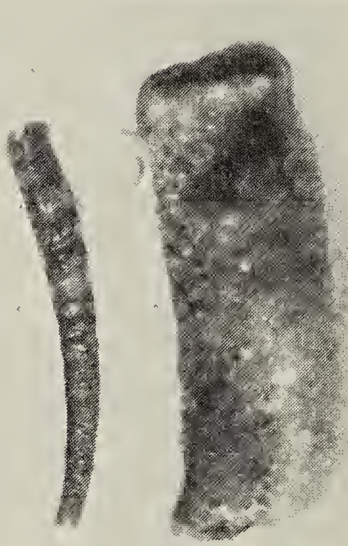

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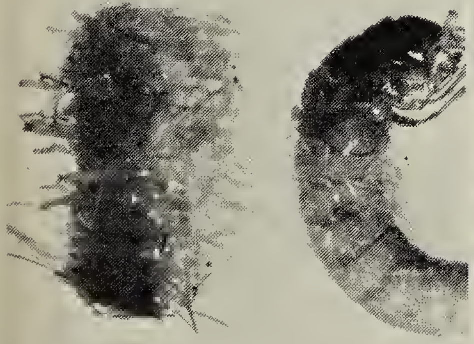

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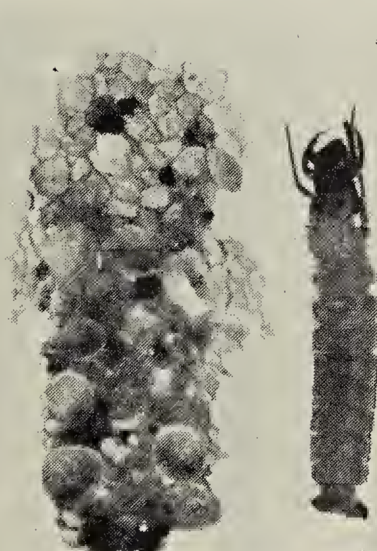

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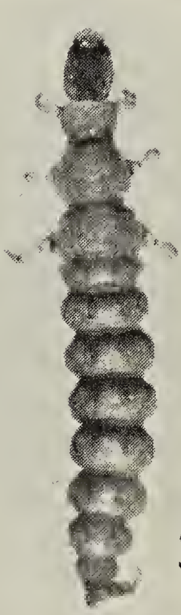

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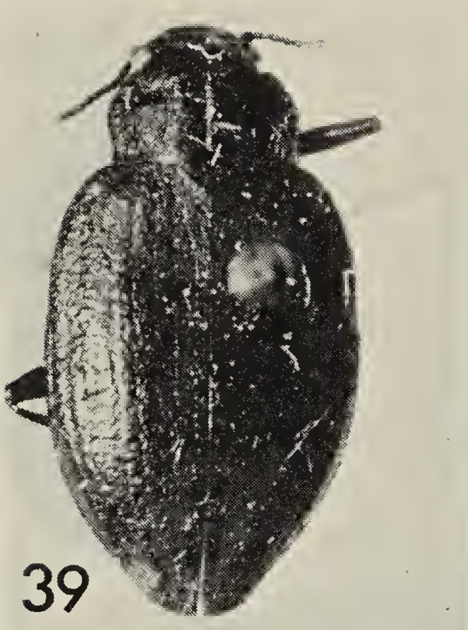
Plate 4. Trichoptera
Fig. 30 Brachycentridae; Fig. 31 Calamoceratidae; Fig. 32 Helecopsychidae; Fig. 33 Hydropsychidae; Fig. 34 Hydroptilidae; Fig. 35 Leptoceridae; Fig. 36 Limnephilidae; Fig. 37 Molannidae; Fig. 38 Rhyacophilidae.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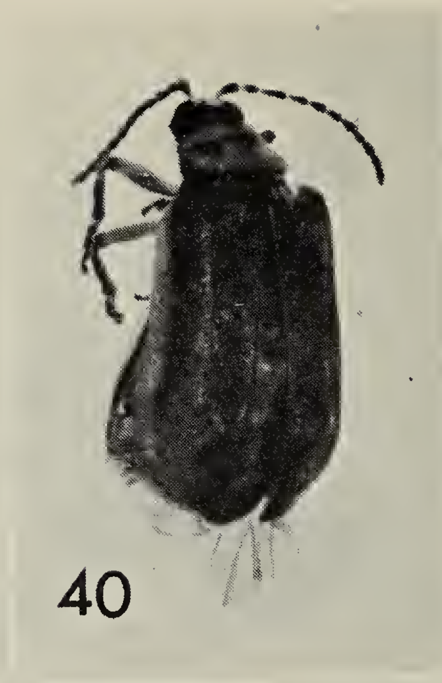
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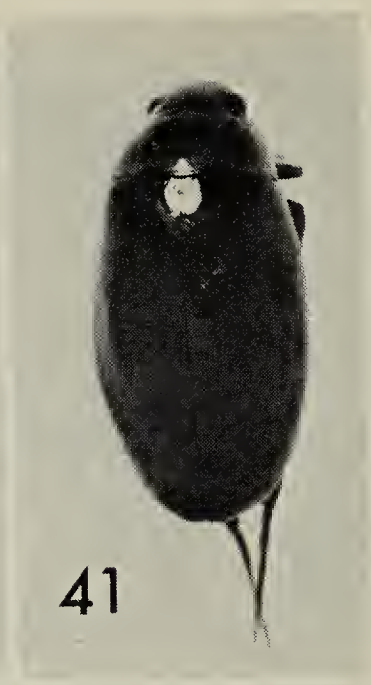
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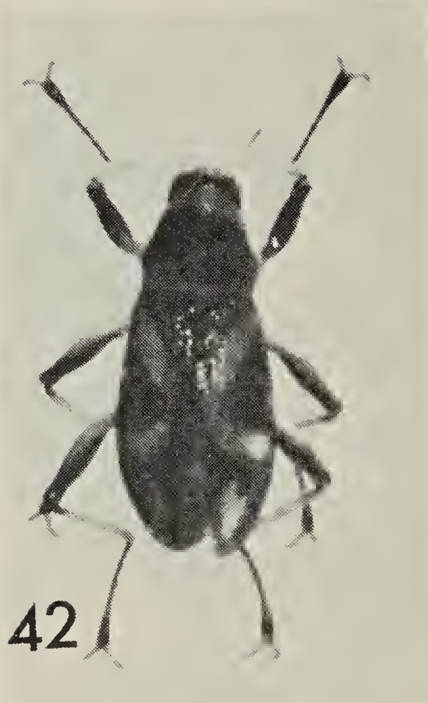
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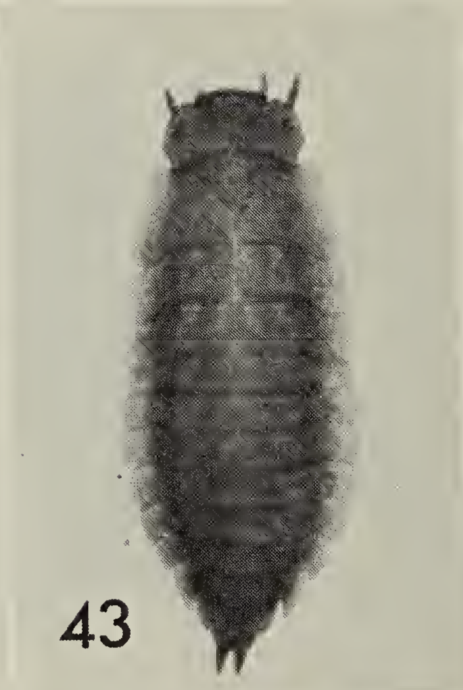
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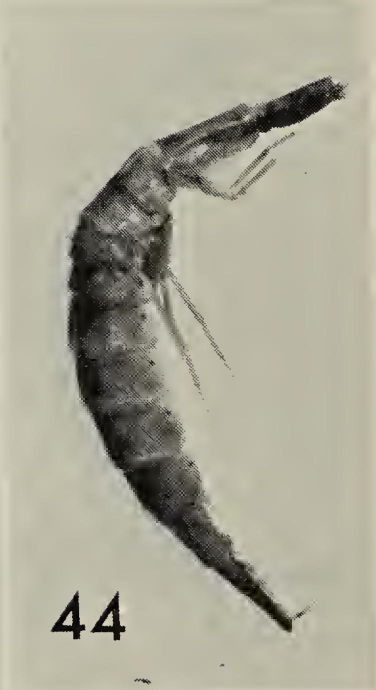
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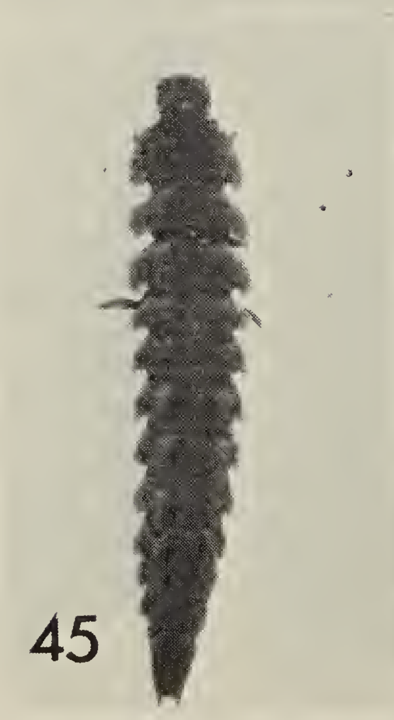
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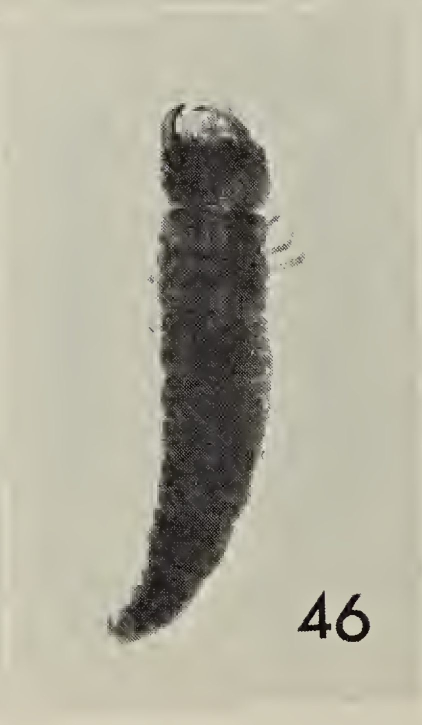
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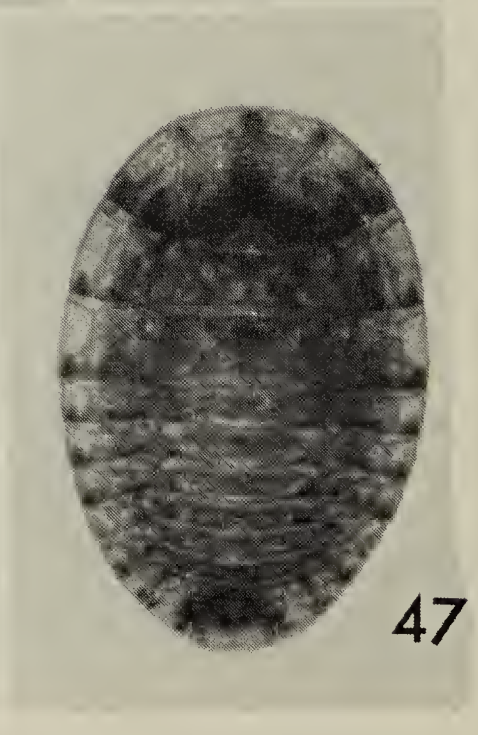
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Plate 5. Coleoptera
Fig. 39 Amphizoidae; Fig. 40 Chrysomelidae; Fig. 41 Dytiscidae; Fig. 42 Elmidae; Fig. 43 Amphizoidae; Fig. 44 Dytiscidae; Fig. 45 Elmidae; Fig. 46 Hydrophilidae; Fig. 47 Psephenidae.

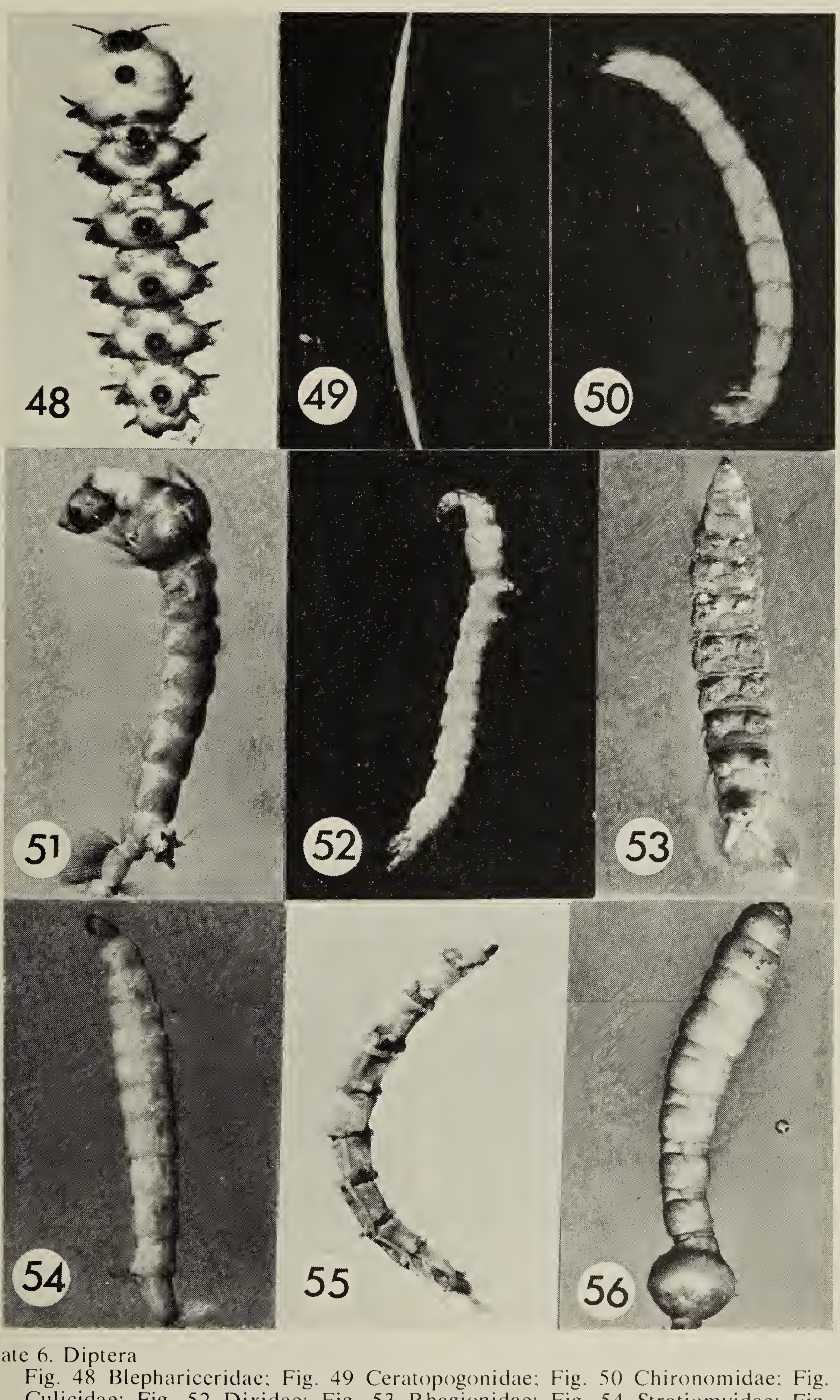

Plate 6. Diptera

Fig. 48 Blephariceridae; Fig. 49 Ceratopogonidae; Fig. 50 Chironomidae; Fig. 51 Culicidae; Fig. 52 Dixidae; Fig. 53 Rhagionidae; Fig. 54 Stratiomyidae; Fig. 55 Tabanidae; Fig. 56 Tipulidae.

RANGE EXTENSION OF PURPLE CONE-FLOWER IN SOUTHEASTERN SASKATCHEWAN

by B. DE VRIES*

The main references to the distribution of the Purple Cone-flower (*Echinacea angustifolia* D.C.) in Saskatchewan are given in Breitung's *Annotated Catalogue of the Vascular Flora of Saskatchewan*, Budd and Best's *Wild Plants of the Canadian Prairies*, and Boivin's *Flora of the Prairie Provinces, Part III.*[2] [3] [1] These sources list the Purple Cone-flower as an occasional to common indigenous entity of the prairie flora on dry river-banks and benchlands in southeastern Saskatchewan.

In an endeavor to locate all known collecting stations of this plant species prior to and after 1957 north of the 49th parallel, the following institutions have been of assistance: Biosystematic Research Institute, Agriculture Canada, Ottawa (DAO); National Herbarium of Canada, National Museum of Canada, Ottawa (CAN); Fort Qu'Appelle Herbarium, Fort Qu'Appelle, Saskatchewan (FQH); Gray Herbarium, Harvard University, Cambridge, Massachusetts (GH); Museum of Natural History, Regina, Saskatchewan (MNR); Herbarium of the New York Botanical Garden (NY); Research Station, Agriculture Canada, University Campus, Saskatoon, Saskatchewan (RAS); Research Station, Agriculture Canada, Swift Current (SCS); Fraser Herbarium, University of Saskatchewan, Saskatoon, Saskatchewan (SASK); Herbarium, University of Alberta, Edmonton, Alberta (ALTA); Herbarium, University of Calgary, Calgary, Alberta (UAC); Herbarium, University of Regina, Regina, Saskatchewan (USAS); United States National Museum, Washington, D.C. (US); Herbarium, University of Manitoba, Winnipeg, Manitoba (WIN).

The author is grateful to Mrs. G. M. Keleher, Department of Botany, University of Manitoba, Winnipeg, for the loan of voucher material, and to all other institutions for their helpful information on *Echinacea angustifolia* collections. The fieldwork was supported by private funds.

The following is an enumeration of collecting data:

ONTARIO: *J. White 59062* (CAN 106685), Brampton, C.P. Railway, July 10, 1902.

MANITOBA: *N. Criddle* (CAN 196884), Aweme, July 30, 1926; *H. J. Scoggan 10950* (CAN 224145), Aweme, 15 miles southeast of Brandon, dry prairie, June 27, 1953; *C. W. Lowe* (WIN 7970), Baldur, dry prairie August 13, 1941; *Macoun 13927* (CAN 106686, NY 13927), Brandon, dry open prairie, July 24, 1896; *idem 11470* (CAN 106687), Brandon, open prairie, September 11, 1884; *J. Fletcher 956* (DAO), Brandon, open prairie, 1895; *Budd and Hubbard 2* (SCS), Brandon, July 22, 1946; *H. H. Marshall 1* (DAO), Brandon, dry hills, July 28, 1947; *G. A. Stevenson 513* (DAO), Brandon, common on open prairie, July 13, 1952; *H. J. Scoggan 9724* (WIN 7965, CAN 2100544), east of

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*Fort Qu'Appelle Herbarium,
P.O. Box 1043,
Central Ave.,
Fort Qu'Appelle, Saskatchewan.
S0G 1S0

Brandon Spruce Woods Forest Preserve, sandy soil, July 18, 1951; *J. Fletcher* (DAO), Carberg Plain, prairies, 1896; *Askell* and *Doris Löve 6100* (WIN 7971, DAO, GH), 6 miles north of Clearwater S21 T3 R12, dry roadside, July 16, 1953, *W. Marquardt* (WIN 7968), Fort Garry University Campus, Manitoba Agricultural College, July, 1930; *J. A. Donaghy* (WIN 7967 and 7969), Grund, S10 and 11 T5 R14, near Grund Church on Balder road, July 28, 1924; *H. Groh* (DAO), La Riviere, prairies, June 19, 1932; *H. A. Wallace 449A-280* (DAO), Melita, meadow, July 26, 1946; *B. Boivin* and *A. J. Breitung 6559* (DAO), Melita, slightly pastured gravelly natural prairie near creek, July 19, 1949; *H. J. Scoggan 9759* (CAN 210546), Melita, in southwest corner of province, grassy prairie, July 20, 1951; *idem 11073* (WIN 7964), Melita, rolling prairie, July 2, 1953 (CAN 224146); *D. Löve* and *B. Boivin 6340* (WIN 7966), Melita, dry prairie, July 12, 1954; *Askell* and *Doris Löve 6018* (WIN 7972, US 2131877, DAO, GH, SASK), 1 mile west of Ninette, S13 T5 R17, prairie, July 14, 1953; *Gérard de Ruyck* (DAO), Rock Lake, Coulée Pembina, Lacs du Plate-Côté, 16 Juillet 1947; *C. Cranston 76* (DAO) 1-1/2 mile south of Shilo on Treesbank Trail - MacDonald District, fire-guard, sandy soil, shade absent, stems quite prickly, August 23, 1950; *B. Boivin* and *W. G. Dore 8255* (WIN 7963, DAO, NY, SCS, SASK, ALTA, USAS), 2 miles west of Shilo, Macdonald District, sandy soil, July 24, 1951; *J. M. Walker 5337* (WIN 20119), Shilo, prairie, August 1968; *Thos. L. Walker* (DAO), Souris County, July 1, 1889; *H. J. Scoggan 9745* (CAN 210545), Souris River, north of Minto, prairie, July 18, 1951 (ALTA); *M. Hoefs* (WIN 7962), Spruce Hills Forest Preserve, open meadow, very dry habitat, August 1966; *H. J. Scoggan 11410* (CAN 224147), Wawanesa, 20 miles southeast of Brandon, denuded prairie at crest of slope above Souris River, July 24, 1953.

SASKATCHEWAN: *B. Boivin 8438* (DAO), 2 milles à l'est d'Alameda, Rivière de la Montange à l'Original, Ecorre de la vallée, 2 août, 1951 (SASK): *R. Hooper 7135* (FQH 4335), Big Beaver, dry slopes, July 20, 1972; *J. L. Bolten 154* (SASK, MNR, RAS, SCS), Carnduff, dry slopes, July 15, 1938; *C. W. Lowe* (WIN 7975, 7976), Estevan, dry sandy soil, July 3, 1939; *W. G. Dore* and *A. J. Breitung 12568* (DAO), Estevan, dry slopes badlands along Souris River, August 14, 1950; *B. Boivin* and *W. G. Dore 7982* (DAO, ALTA, USAS), Estevan, lower part of cliff bordering the valley of the Souris River, July 17, 1951; *T. M. Willing 456* (DAO, SASK), south of Estevan, July 11, 1900; *J. Looman 651* (SCS, FQH 3372), Frobisher, August 15, 1962; *D. Löve* and *B. Boivin 6353* (WIN 7974) Glen Ewen, dry prairie, July 13, 1954; *B. Boivin, D. Löve,* and *D. Dunbar 10294* (DAO), Glen Ewen, Ecorre de la coulée Souris, 13 juillet 1954; *B. Boivin* and *A. J. Breitung 6602* (DAO), Glen Ewen, upper part of dry bluff along Souris River, July 20, 1949; *G. F. Ledingham* and *S. Yip 2267* (USAS), 2 miles south of Glen Ewen, open prairie slopes above Souris River, July 11, 1956; *idem 2307* (USAS), 10 miles southeast of Hirsch, open grassy slopes above Souris River, August 11, 1956; *H. Morrison 68-361* (SASK), Lower Big Muddy Valley, S1 T2 R22 W2, dry hillside, fairly common, July 30, 1968; *B. Boivin* and *W. G. Dore 7943* (WIN 7973, DAO, NY, SCS, UAC), south of Macoun, dry south-facing embankment of the valley of the Souris River, July 16, 1951; *H. Groh* (DAO), Oxbow, prairies, June 27, 1932; *W. G. Dore* and *A. J. Breitung 12594* (DAO), Oxbow, natural prairie on slope of Souris River Valley, rays absent, disk florets abnormal, August 14, 1950; *idem 12595* (DAO), Oxbow, abundant on grassy slopes of Souris River Valley, rays lilac, August 14, 1950; *B. Boivin* and *W. G. Dore 8048* (DAO), Oxbow, dry south-facing slope of escarpment bordering the valley of the Souris River, July 19, 1951; *J. B. Campbell* (SCS), Roche Percee, July 31, 1945; *B. Boivin* and *W. G. Dore 8013* (DAO, SASK), Roche Percee, lower part of rockslide below sandstone cliff bordering the valley of the Souris River, July 17, 1951; *B. de Vries 5138* (FQH 3373), Round Lake, Qu'Appelle Valley, south-facing slope, open exposure, August 5, 1971; *idem 5994* (FQH 0171), Round Lake, Qu'Appelle Valley, open slopes between Grimeau Park and Maple Grove, July 7, 1974; *G. F. Ledingham* and *M. D. Fahselt 3601* (USAS), Round Lake, 45 miles northeast of Regina, dry slopes of the Qu'Appelle Valley, August 4, 1963; *R. C. Russell* (RAS), Round Lake, Stockholm, dry hillside, June 19, 1937; *idem S57090* (DAO), Stockholm, near base of hillside along the Qu'Appelle Valley, June 19, 1937; *E. H. Moss 2508* (ALTA), Weyburn, July 3, 1932; *E. Bourgeau* (GH), Saskatchewan, Palliser's British North American Exploratory Expedition, 1857-1858.

Under study it became apparent that the Purple Cone-flower is well

Prairie (Long-headed) Coneflowers. R. E. Gehlert

distributed throughout temperate North America, ranging from Texas north to Colorado and Montana, east to Oklahoma and Minnesota, and occurs in southern Ontario and Manitoba, and as disjunct populations in southeastern Saskatchewan.

On many field trips over the prairies, the author's attention was focussed on a possible north or westward range extension of this plant species. Subsequently a northwestward extension was discovered in the Qu'Appelle Valley in southeastern Saskatchewan on July 18, 1974. Well established populations occur in a tributary coulee northwest of Lebret, 5 miles east of Fort Qu'Appelle, on open slopes. Voucher specimens are represented in the Fort Qu'Appelle Herbarium under De Vries *6989* (FOH 0176).

The first record of *Echinacea angustifolia* for the prairie provinces is based on a collection by Bourgeau from "Saskatchewan" on Palliser's British North American Exploratory Expedition, 1857-1858. As only the locality, "Saskatchewan", was indicated and both Saskatchewan and Manitoba were then a part of the Northwest Territories, the geographical location of this collection is very imprecise. The first record of the species from Manitoba is based on a collection by Macoun (No. 11470) from Brandon in 1884.

The 1937 collection of *Echinacea angustifolia* by Russell, represents a first northward extension in southeastern Saskatchewan. His geographic documentation is somewhat vague and in all likelihood he meant an area between the junction of Highways 9 and 247 and Birds Point along the north wall of the Qu'Appelle Valley near Round Lake, where subsequent collections of this plant species have been made.

The unusual disjunction between stations in southern Saskatchewan and the Qu'Appelle Valley, a direct line of approximate 150 km (90 miles), warrants consideration. The occurrences in southern Saskatchewan, from Carnduff to Estevan, are in contiguity along Highway 18 and indicate clearly that *Echinacea angustifolia* is indigenous to the mixed prairie (*Stipa-Bouteloua*) association. Big Beaver in the Lower Big Muddy Valley is presently the known western limit. The two localities in the Qu'Appelle Valley, on the other hand, occur in the Aspen Grove formation of southeastern Saskatchewan, and are part of the *Stipa-Bouteloua-Agropyron* faciation with close affinity to xeric loam of open slopes. They appear to be the known northern outliers of the more widely spread populations in southern Saskatchewan.

The present study describes the distributional pattern of *Echinacea angustifolia* in southeastern Saskatchewan, which to the best knowledge of the author, has not previously received detailed investigation. The distribution maps of the original monograph of the genus *Echinacea* by McGregor (1968) stopped short of the United States-Canadian border (personal communication, Harms, 1974), and only one Saskatchewan (Estevan, *Dore and Breitung 12568*) and two Manitoba (Ninette, *A. & D. Löve 6018*; Brandon, *J. Macoun 13927*) specimens were cited in the text.

[1] BOIVIN, B. 1972. *Flora of the Prairie Provinces, a handbook to the flora of the provinces of Manitoba, Saskatchewan, Alberta, Part III.* Provancheria 4, Memoires de l'Herbier Louis Marie, Faculté d'Agriculture, Université Laval, and Department of Agriculture, Ottawa 1-224.

[2] BREITUNG, A. J. 1957. *Annotated catalogue of the vascular flora of Saskatchewan*. American Midland Naturalist 58: 1-72.

[3] BUDD, A. C. and K. F. BEST. 1964. *Wild Plants of the Canadian prairies.* Canada Department of Agriculture, p. 1-519.

[4] McGREGOR, R. L. 1968. *The taxonomy of the genus Echinacea Compositae*, University of Kansas Science Bulletin, Vol. 48: 113-370.

[5] SCOGGAN, H. J. 1957. *Flora of Manitoba.* National Museum of Canada Bulletin No. 140, p. 1-619.

Hoar frost on barbed wire. J. B. Gollop

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Next two pages:
Purple Lesser Fritillaries on Goldenrod. Fred Lahrman

PROBLEMS OF A MOTHER GOLDENEYE — AN APPRECIATION OF THE HUNTING AND GATHERING SOCIETY

by MAUREEN REVER*

This article is dedicated to the memory of Rosalee Early, for many years an active member of the Saskatoon Natural History Society and its executive. Her enthusiasm for all living things was contagious. I know that Rosalee, who named and helped look after Archie, the first goldeneye duckling we tried to raise, would have been the first to volunteer to help with Dominic, around which this article revolves.

For several years I have been studying the nesting behaviour of the Common Goldeneye at Emma Lake in central Saskatchewan. The goldeneye is a tree-nesting duck which usually uses abandoned woodpecker holes (flicker or Pileated Woodpecker) as nest sites. Because such holes seemed to be a factor limiting goldeneye population increase at Emma Lake, over the past 10 years .80 nest boxes have been built and erected on Fairy Island and on the shores of Emma Lake.[1]

Every year at least 50% of goldeneye clutches are not incubated. These clutches occur in what we call "dump nests". The age or condition of the birds laying these eggs is still not clear. We do know that more than one female usually contributes to the clutch of 1 to 18 eggs. We suspect that 1st year females are more often involved than older birds.

To determine whether or not "dump nest" eggs were fertile, we moved some to an incubator in the Dept. of Biology, University of Saskatchewan, Saskatoon, once we had determined they were not going to be incubated. It did not take long to determine that the eggs definitely were fertile. However, that was only the beginning. The end was Dominic!

It was not an easy birth. On the evening of June 29, one of the eggs put into the incubator 28 days earlier began to pip. The shell was broken through but not until the early morning hours of July 2 did the goldeneye emerge. It had been a long struggle and we had had to keep the pipping egg moist with wicks to keep the humidity high enough to prevent the emerging duckling from drying out. The conditions suitable for chickens and pheasants, our usual incubator birds, were not quite right for goldeneyes. It may be more important that these eggs undergo the temperature fluctuations characteristic of the wild resulting from the female's on-and-off-the-nest patterns. Also with ducks, the eggs are apparently moistened by the breast feathers of the female as she returns from the water. The time required for our incubator duckling to emerge from the time of first pipping was similar to what I had

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found in the wild (about 48 hours). The amount of energy required to get out of the tough shell must be considerable.

Normally, young goldeneyes remain 24 to 48 hours in the nest box before the mother calls them out. In this case, I removed the young duckling from the incubator at 5:30 a.m. on July 2 to take him to Emma Lake where I hoped to find a wild foster mother. He was barely dry and his conspicuous black and white markings with four white spots on his back reminded me of a domino. The domino resemblance prompted me to call him Dominic. Two of three earlier ducklings which had been left in the nest boxes by the mothers died after a few days. Archie, the first, died after 1 week of pneumonia which had been contracted in the nest box where he had been left on a cold, wet day. Bartholemew, the second, hatched in the heat of the day after his mother had taken out the rest of the brood. He died after 2 days of *Escheria coli* infection of the yolk sac. This impared his limb movement so that he had difficulty swimming and standing to oil himself. The third, Caroline, was adopted by another female with a brood 2 days older than herself.

When he was removed from the incubator, Dominic was making quite audible clicking sounds at a rate of 38 or 39 per minute. Apparently, these clicking noises begin well before hatching and serve to synchronize the "breaking out" of a brood. It was interesting that they continued after hatching in this chick and it may be possible in another year to observe whether this clicking continues after hatching when the adult goldeneye is present.

Dominic sat in my hand all the way to Emma Lake. That was his undoing — or mine! In those few hours after birth he became imprinted — especially to my voice.

We attempted to have him adopted several times by a goldeneye hen with brood during the first 2 days of his life. He responded to the female goldeneye's call by peeping loudly but did not know what to do from there. He would return to the boat or wait in the middle of the bay, cheeping until we returned for him. Dominic believed he was a person, not a duck.

Young goldeneyes can go without food or water for the first 2 days after hatching. In the wild, once the mother brings them out of the nest, they are led to the water and immediately begin to drink and feed themselves. I have watched the young dive 4 or 5 feet to the bottom almost as soon as they first entered the water. They are powerful swimmers and use the "oversize" feet to propel themselves in search of small crustaceans and other water creatures.

For his first hours alone, Dominic was placed in a covered box on a heating pad with water nearby. He was not very interested in either food or water the 1st day. The 2nd day, he knew he was a duck and swam, dove and ate happily in a marshy area near the lake. But he soon learned that "mama" wore black rubber boots with red bands, running shoes or no shoes at all. He followed me everywhere. Within 3 days he had learned to distinguish my voice from other female voices and would follow only me, if I spoke. Otherwise he followed other people's feet with little discrimination.

From his debut at Emma Lake, Dominic had many friends — biology and art students and faculty, camp administrators, cooks and groundsmen. They were all to play a role in Dominic's life and the time they volunteered to help look after him made my life much easier. Special thanks are due to the Bob Haynes family, Floyd Connor and Lou Nicholson.

My schedule did not permit Dominic to spend as much time on the water as he needed to feed himself entirely and, even when he was swimming, he was not always in that part of the lake with the richest food supply. When left on his own, his feeding time in the water was between 15 and 20 minutes at a stretch. He would then come out on his own, preen and dry off, relax and then go back into the water after another 15 or 20 minutes.

To supplement Dominic's food, several ounces of adult mosquitoes were caught before he was put in his box for the night. He was quite happy to be placed in the covered net with the mosquitoes and made recognizable "happy" sounds as he devoured the contents.

When he was 5 days old, Dominic returned with me to Saskatoon. Trying to be a mother duck in the city is much more difficult than in the country. It soon became clear that finding food and swimming time for Dominic took most of the daylight hours. He was 6 days old when he made his first visit to Pike Lake and, although he fed well there, he consumed several hundred insects caught on the way home — dragonflies (wings and all), grasshoppers and assorted flies, moths and other insects. Because it was so handy, the pond on the university campus near the old Victoria School became Dominic's swimming hole. The supply of dragonfly larvae (*Sympetrum* sp.) was abundant here. In addition to what he caught by himself each day in approximately 5 hours in and around the pond, Dominic consumed between 300 and 500 larvae as well as whatever other live food I could catch for him. The back lanes adjacent to our home were combed every night with an aerial net and frequent excursions were made to nearby sloughs to collect aquatic insects with a bottom net. These insects were added to the bathtub where Dominic dove happily as long as I was within sight. Most people assume ducklings will eat grain, bread or other vegetable material. Not so for goldeneyes. Dominic was almost 3 weeks old before he could be persuaded to eat oatmeal in water and it was several days later before he took a porridge of oatmeal, turkey starter, granola and raisins. His weakness was the raisins. This mixture seemed to

give him the additional carbohydrate he needed to sustain his growth and his walking and swimming activities. Mealworms from Biology Department cultures were an important source of food when the supply of dragonfly larvae was exhausted both by our collecting and by their natural emergence patterns. Anyone who considers taking on a young goldeneye had better be prepared to become part of the hunting and gathering society for most of the day.

At about 2 weeks of age, Dominic's black and white pattern began to turn to brown and white. The most noticeable anatomical changes were the increased size of wings, bill, feet and legs. At almost 4 weeks, the only real feathers were tail feathers. He liked to flap his wings and run along the water but it would be some time yet until he flew.

Dominic followed me everywhere in the house, out in the garden and

through the halls of the Biology Department. His only break from following my voice was a night he spent "happily" sitting in the living room alone, apparently enthralled by the voices on the television set to which he was exposed for the first time in his life.

Dominic had three distinct calls. The first was a recognition call which sounded like — Chee! It followed a period when he had been alone and was then called by name. The second call, his regular cheeps, developed into a louder distress call when he was left alone. Finally his contented "brrrt" when he was eating or sitting beside me on the beach.

For the 4th week of life, Dominic was back at Emma Lake. He wanted to be within sight of the water from dawn until dark but he still followed his adopted parents' legs faithfully, however reluctantly, even when they left the water.

I don't know yet if Dominic will fly in the fall. I hope he will and that he will return to Emma Lake next spring. His lack of fear of people and cars may be his greatest problem. He has brought a great deal of joy to me and to his many friends and he is teaching me much about goldeneye development. This is not an experiment that I would recommend any reader try. The time required is very great and there is no guarantee that the duck will survive either the struggles against diseases, such as pneumonia, or parasites, such as leeches and tapeworms, or lurking jackfish which take a high toll of the young. So far Dominic has been lucky and we hope his luck will continue.

Obituary:

One hour after this article was finished, I learned that Dominic had been killed by a Goshawk as he was going from the cabin to the lake at Fairy Island. He was 30 days old.

[1] REVER, MAUREEN, and R. S. MILLER. 1972. *Common Goldeneyes and the Emma Lake nest boxes.* Blue Jay 31:27-30.

HYBRID BLUEBIRD NESTING NEAR RUSSELL, MANITOBA

by JIM SPEAR*

Richard and Coleen Wileman of the Endcliffe district, 6 miles northwest of Russell, Manitoba, have been looking after a bluebird line for the past 2 years. They send their reports to the Brandon Birders' Club. They have been very fortunate to have the bluebirds come right to their yard! Nest boxes were set so they could be watched from a window. The first nesting was started about the end of May, 1975; the two Mountain Bluebirds had six eggs by June 14.

That afternoon the eggs disappeared and all that was found was a wing of the female. The nest was not disturbed in anyway. On June 19 the male returned with another mate and so the nest box was moved about 60 feet as it was quite close to a tree, which could have been involved in the disappearance of the first nesting. On June 21 the female started building a nest with feathers which she brought in for about 3 hours. During the next week she laid six eggs, all of which hatched.

The interesting part is that, by all appearances, the male and female were Mountain Bluebirds, but on closer observation the female had rusty brown feathers mixed in all over the grey breast, so she must have been a cross. We will be keeping a close watch next year, as this is the first record of such mating in this area.

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*Russell, Manitoba.

THE BIRDS NORTH OF LESSER SLAVE LAKE, ALBERTA

by HUGH C. SMITH*

The area north of Lesser Slave Lake, Alberta, has only recently been opened to vehicular travel and, as a result, ornithological investigations have been few. Erskine was the first to go into the area by car and report his findings.[5] Early naturalists through the area, Preble,[7] Williams[10] and Eaton[3], did not travel far from the two major rivers that border the area, the Peace on the west and north and the Athabasca on the east. Baker and Walkinshaw[2], Soper[9] and Godfrey[6] reported on their work in the area south of Lesser Slave Lake.

The Provincial Museum of Alberta spent 52 days during the last 4 years inventorying birds in the area. Camps were set up at Utikuma Lake (S4-Tp80-R8W5) from June 1 to 6 and at a small lake, locally known as Bear Lake, (84-9W5) from June 14 to 20 in 1971; at Goosegrass Lake (91-3W5) from May 29 to June 10, 1972, from June 4 to 12 and June 21 to 30, 1973, and from May 28 to June 3, 1974. From here trips were made to God's Lake and Skunk Lake 5 and 2 miles (8 and 3 km) away. The study area extended 75 miles (120 km) northeast of Utikuma Lake and was 2 to 3 miles (4 to 5 km) wide. Erskine's study area was between Salt Prairie and Gift Lake. (Fig. 1).

The study area is within the mixedwood section of the Boreal Forest Region.[8] The major trees are Trembling Aspen (*Populus tremuloides*), Balsam Poplar (*Populus balsamifera*), White Spruce (*Picea glauca*), Black Spruce (*Picea mariana*), and Balsam Fir (*Abies balsamea*). Forest fires have occurred in most of the region at one time or another, so that in many places there is a large amount of deadfall which makes walking through the forest extremely difficult. Two oilfields, Nipisi and Red Earth, are located within the study area. As a result large sections of the forest are crossed by survey lines. Lakes of various sizes are found throughout the forest. The area is slightly rolling with no major topographic features. Trout Mountain, at an elevation of approximately 2,600 feet above sea level, is the highest point. The drainage is poor. Several small, slow moving streams connect many of the lakes and eventually drain into the Wabasca River which empties into the Peace River.

A number of people from the Provincial Museum were involved in field trips to the study area and their contribution to this paper is appreciated. Ludo Bogaert, Rod Burns, Michael Hampson, Jasper Keizer, Ron Solkoski, and David Spalding made their field notes available.

SPECIES LIST: The nomenclature used in this list (Table 1) is according to the

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*Provincial Museum of Alberta, Edmonton, Alta.

Provincial Museum of Alberta, Contribution No. 22

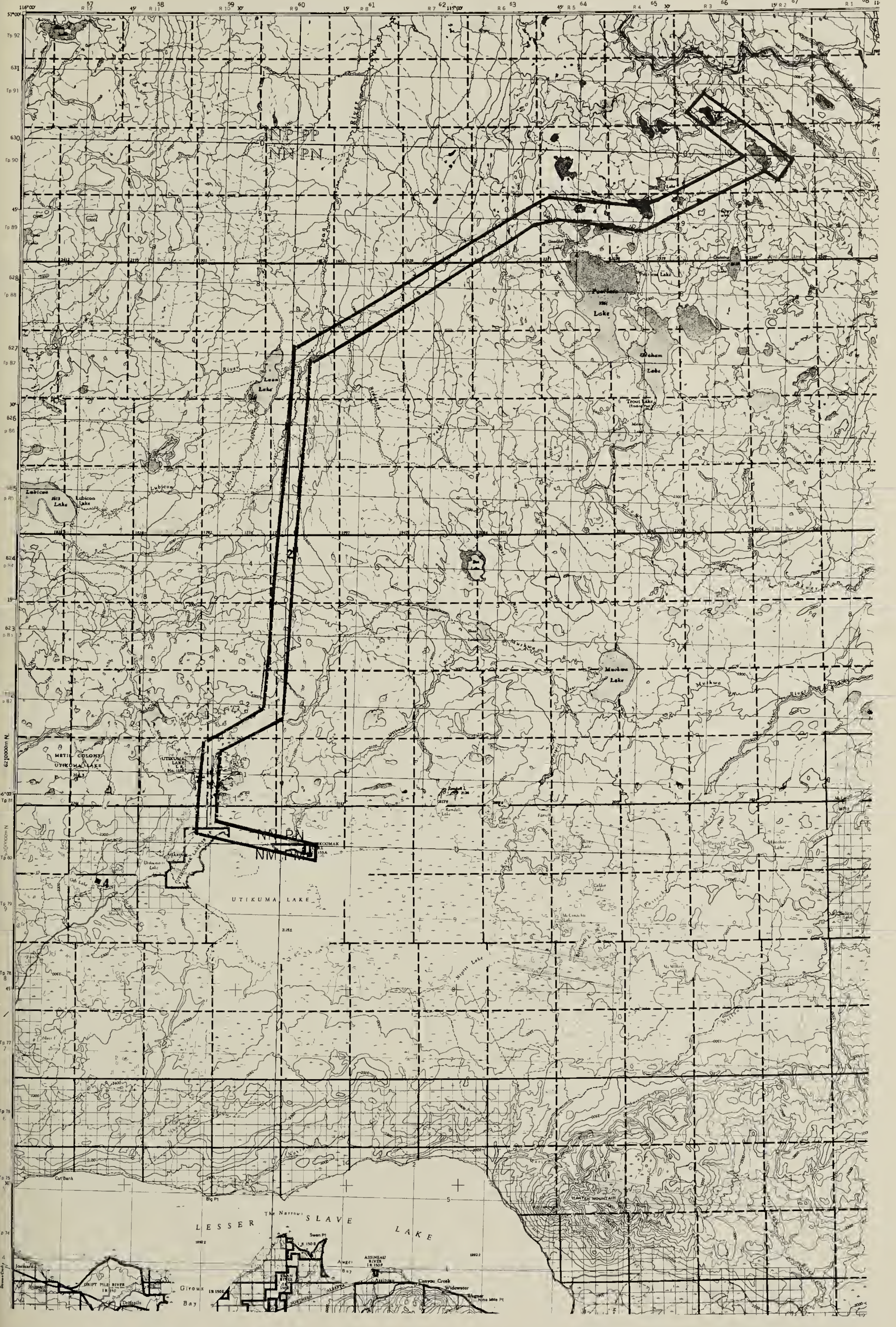

Fig. 1. Map of North Central Alberta, showing approximate route and the following camps: (1) Utikuma Lake Camp; (2) Bear Lake Camp; (3) Goosegrass Lake area; (4) Erskine's Camp.

Table 1
Species list for Uitkuma Lake - Goosegrass Lake area

Species	Utikuma Lake	Bear Lake	Goosegrass Lake	God's Lake	Skunk Lake	No. of days seen — Largest no. seen on any one day.	% of days seen	
							Erskine	Smith
Common Loon*	x	x	x		x	14-3	40.9	26.9
Red-necked Grebe* †		x	x		x	22-6	56.8	42.3
Horned Grebe†	x		x		x	5-4	50.0	9.6
Eared Grebe†	x	x				2-2	11.4	3.8
Western Grebe†	x			x		4-25	6.8	7.7
Pied-billed Grebe†		x				3-2	11.4	5.8
White Pelican	x					1-1	2.3	1.9
Double-crested Cormorant			x			1-1		1.9
Great Blue Heron			x			4-2	2.3	7.7
American Bittern							2.3	
Canada Goose (Seen along Wabasca River)						3-4		5.8
Mallard* †	x	x	x	x	x	22-17	61.4	42.3
Gadwall		x	x	x		6-2	6.8	11.5
Pintail	x			x		2-7	9.1	3.8
Green-winged Teal* †	x		x		x	9-5	47.7	17.3
Blue-winged Teal†	x		x		x	13-5	50.0	25.0
American Wigeon* †	x	x	x	x	x	17-21	61.4	32.7
Northern Shoveler†	x	x	x		x	5-6	18.2	9.6
Redhead†	x					1-1	20.5	1.9
Ring-necked Duck†		x	x		x	3-5	18.2	5.8
Canvasback†	x					1-1	9.1	1.9
Lesser Scaup†	x	x	x	x	x	15-32	75.0	28.8
Common Goldeneye* †	x	x	x	x	x	16-30	52.3	30.8
Barrow's Goldeneye							18.2	
Bufflehead* †	x	x	x	x	x	18-100	72.7	34.6
White-winged Scoter†	x	x	x	x	x	22-24	59.1	42.3
Surf Scoter			x		x	4-15	2.3	7.7
Ruddy Duck†		x				3-2	47.7	5.8
Common Merganser (Seen along Wabasca River)						1-2		1.9
Goshawk	x		x	x		4-1	2.3	7.7
Cooper's Hawk							2.3	
Sharp-shinned Hawk	x					3-2		5.8
Red-tailed Hawk†	x	x	x			12-1	38.6	23.1
Bald Eagle*		x	x			14-4	2.3	26.9
Marsh Hawk	x	x		x		7-4	15.9	13.4
Osprey	x					3-2		5.8
American Kestrel†	x	x	x		x	11-4	56.8	21.1
Spruce Grouse†							4.5	
Ruffed Grouse†	x	x	x	x	x	8-1	13.6	15.4
Sharp-tailed Grouse†							2.3	
Sora	x	x	x		x	9-1	31.8	17.3
American Coot* †	x	x	x		x	12-3	65.9	23.1
Killdeer*	x	x	x			8-2	56.8	15.4
Common Snipe†	x	x	x	x	x	22-4	47.7	42.3

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*Evidence of nesting in this study.

†Evidence of nesting in Erskine's study.

Species	Utikuma Lake	Bear Lake	Goosegrass Lake	God's Lake	Skunk Lake	No. of days seen — Largest no. seen on any one day.	% of days seen	
							Erskine	Smith
Upland Plover							2.3	
Spotted Sandpiper*	x	x	x	x	x	23-4	34.1	44.2
Solitary Sandpiper†			x			2-1	68.2	3.8
Greater Yellowlegs		x	x	x		7-4		13.4
Lesser Yellowlegs	x	x	x	x	x	22-10	65.9	42.3
Baird's Sandpiper			x			1-1		1.9
Pectoral Sandpiper							4.5	
Least Sandpiper							9.1	
Dowitcher							6.8	
Semipalmated Sandpiper							4.5	
Northern Phalarope							2.3	
Wilson's Phalarope							13.6	
Herring Gull	x			x	x	3-3		5.8
California Gull			x	x	x	6-12		11.5
Ring-billed Gull	x		x			3-2		5.8
Franklin's Gull†	x		x			3-4	56.8	5.8
Bonaparte's Gull†	x	x	x	x	x	11-50	11.4	21.1
Common Tern†	x		x	x	x	7-4	15.9	13.4
Black Tern†	x	x	x			16-20	77.3	30.8
Rock Dove†							2.3	
Mourning Dove							6.8	
Great Horned Owl		x	x		x	6-1	2.3	11.5
Hawk Owl		x				1-1		1.9
Long-eared Owl	x					1-1		1.9
Short-eared Owl	x					1-1		1.9
Common Nighthawk	x	x	x	x		16-10	54.5	30.8
Belted Kingfisher			x			4-1	4.5	7.7
Common Flicker* †	x	x	x	x	x	26-3	68.2	50.0
Pileated Woodpecker			x			3-1	4.5	5.8
Yellow-bellied Sapsucker* †	x	x	x	x	x	20-3	54.5	38.5
Hairy Woodpecker†			x			2-2	6.8	3.8
Downy Woodpecker†			x	x		2-1	6.8	3.8
Northern Three-toed Woodpecker			x			4-1	2.3	7.7
Eastern Kingbird* †	x	x	x		x	9-2	61.4	17.3
Eastern Phoebe			x			4-1		7.7
Say's Phoebe			x			1-1		1.9
Alder Flycatcher	x	x	x	x		12-4	36.4	23.1
Least Flycatcher*	x	x	x	x	x	19-6	43.2	36.5
Western Wood Pewee*	x	x				13-10	75.0	25.0
Olive-sided Flycatcher		x	x	x		9-2	29.5	17.3
Horned Lark	x					1-1		1.9
Tree Swallow	x	x	x	x	x	32-20	61.4	61.5
Bank Swallow	x					1-1	4.5	1.9
Barn Swallow†	x	x	x	x		10-2	4.5	19.2
Cliff Swallow (Colony seen at Red Earth)						1-?	20.5	1.9
Purple Martin	x		x			4-1	31.8	7.7
Gray Jay	x	x	x		x	20-10	54.5	38.5
Blue Jay							6.8	
Black-billed Magpie	x	x				5-2		9.6
Common Raven	x	x	x	x	x	23-13	9.1	44.2
Common Crow	x		x			6-3	18.2	11.5
Black-capped Chickadee†	x	x	x	x		9-2	40.9	17.3
Boreal Chickadee*			x			7-2	13.6	13.4
White-breasted Nuthatch			x			1-1		1.9

Species	Utikuma Lake	Bear Lake	Goosegrass Lake	God's Lake	Skunk Lake	No. of days seen — Largest no. seen on any one day.	% of days seen	
							Erskine	Smith
Red-breasted Nuthatch*			x			10-3	2.3	19.2
Brown Creeper			x			4-3		7.7
House Wren							18.2	
Winter Wren							9.1	
Long-billed Marsh Wren (Seen at Loon Lake)						1-1	9.1	1.9
Gray Catbird			x			1-1		1.9
American Robin* †	x	x	x	x	x	23-4	90.1	44.2
Hermit Thrush*	x		x	x	x	10-2	22.7	19.2
Swainson's Thrush* †	x	x	x	x	x	30-6	43.2	57.7
Mountain Bluebird							2.3	
Golden-crowned Kinglet							2.3	
Ruby-crowned Kinglet		x	x	x		12-9	15.9	23.1
Bohemian Waxwing		x	x			5-5		9.6
Cedar Waxwing	x	x	x			3-6	47.7	5.8
Common Starling* †	x					3-2	34.1	5.8
Solitary Vireo			x			5-5		9.6
Red-eyed Vireo*	x	x	x	x	x	20-6	34.1	38.5
Philadelphia Vireo			x			3-2		5.8
Warbling Vireo	x	x		x		4-2	28.6	7.7
Black-and-White Warbler	x		x	x		11-3	22.7	21.1
Tennessee Warbler*	x	x	x	x	x	45-17	28.6	86.5
Yellow Warbler	x		x		x	14-9	38.6	26.9
Magnolia Warbler	x		x	x		4-4	2.3	7.7
Cape May Warbler			x			3-6	2.3	5.8
Yellow-rumped Warbler	x		x	x	x	21-13	18.2	40.4
Black-throated Green Warbler							4.5	
Bay-breasted Warbler			x			8-25	4.5	15.4
Blackpoll Warbler	x			x		2-1	4.5	3.8
Palm Warbler		x	x		x	3-2	6.8	5.8
Ovenbird		x	x	x		12-8	38.6	23.1
Northern Waterthrush	x		x	x	x	16-3	25.0	30.8
Connecticut Warbler	x					1-1	2.3	1.9
Mourning Warbler	x	x	x			9-5	18.2	17.3
Common Yellowthroat	x	x	x			9-2	18.2	17.3
Wilson's Warbler	x					1-1		1.9
Canada Warbler			x			1-2		1.9
American Redstart	x		x			6-5	15.9	11.5
House Sparrow	x	x	x			5-1	28.6	9.6
Yellow-headed Blackbird							4.5	
Red-winged Blackbird* †	x	x	x		x	25-25	90.1	48.1
Northern Oriole							2.3	
Rusty Blackbird*			x	x	x	7-10	15.9	13.4
Brewer's Blackbird	x	x			x	5-5	11.4	9.6
Common Grackle†			x		x	5-4	31.8	9.6
Brown-headed Cowbird	x	x	x	x	x	10-25	28.6	19.2
Western Tanager	x		x			17-5	2.3	32.7
Rose-breasted Grosbeak	x	x	x	x		16-3	9.1	30.8
Evening Grosbeak			x			2-4	2.3	3.8
Purple Finch		x	x			7-3	6.8	13.4
Pine Grosbeak			x			2-1	2.3	3.8
Pine Siskin		x	x	x		8-10	22.7	15.4
American Goldfinch	x		x			2-1	2.3	3.8
White-winged Crossbill		x				2-2	13.6	3.8
Savannah Sparrow	x					5-1	11.4	9.6
LeConte's Sparrow	x	x		x	x	4-2	22.7	7.7
Sharp-tailed Sparrow							11.4	

Ruffed Grouse drumming. L. A. Morgotch

Species	Utikuma Lake	Bear Lake	Goosegrass Lake	God's Lake	Skunk Lake	No. of days seen — Largest no. seen on any one day.	% of days seen	
							Erskine	Smith
Vesper Sparrow							6.8	
Lark Sparrow (A flock seen vicinity Trout Mtn.)						1-4		1.9
Dark-eyed Junco* †		x	x	x	x	21-8	40.9	40.4
Chipping Sparrow*	x	x	x	x	x	24-12	34.1	46.2
Clay-colored Sparrow	x					6-2	15.9	11.5
White-throated Sparrow*	x	x	x	x	x	44-7	59.1	84.6
Fox Sparrow			x		x	4-1	25.0	7.7
Lincoln' Sparrow	x	x	x		x	6-4	47.7	11.5
Swamp Sparrow	x			x	x	3-1	28.6	5.8
Song Sparrow	x	x	x			12-3	40.9	23.1

A.O.U. Checklist, as amended by Eisenmann.[1] [4] To provide a comprehensive list of the birds of the area I have included species recorded by Erskine.

DISCUSSION: This study recorded 140 species with evidence of nesting for 29. Erskine reported 138 species of which 44 were nesting. The two studies combined recorded 164 species with 58 nesting.

To indicate abundance Erskine reported the number of days a species was seen as well as the greatest number of individuals seen on a given day. For example, his notation "18-3" indicated that a species was seen on 18 days and that 3 individuals was the greatest number seen on one day. In order to compare Erskine's data with this study I used the same index and then converted the days seen to a percentage of possible days seen for both studies. I used 45 days for Erskine's study as determined from the dates listed in his paper.

The two studies disagree on the most frequently recorded species (Table 2). These differences may not be solely a factor of abundance but may be, and probably are, artifacts of the studies. For example, the way data was recorded, the skill of the observers in identifying birds, the diligence with which areas were searched for birds, and the amount of time spent in different habitats all tend to distort the number and frequency of birds recorded. As an illustration of this, it is tempting to say

Table 2

Five most frequently recorded species in decreasing order of frequency

SMITH
Tennessee Warbler
White-throated Sparrow
Tree Swallow
Swainson's Thrush
Common Flicker

ERSKINE
American Robin and
Red-winged Blackbird
Black Tern
Lesser Scaup
Western Wood Pewee

that Robins and Red-winged Blackbirds were the most common birds of the area according to Erskine. This may be so but, if Erskine's camp was so situated that it was adjacent to a marsh or was within the nesting area of a Robin, these birds would have a tendency to be recorded more frequently than others. If, however, the recording of species was always done away from the camp site these data would have a different meaning.

Table 3
Six most frequently recorded ducks

	Smith	Erskine
Mallard	1	3
Wh.-wgd. Scoter	1	5
Bufflehead	3	2
Am. Wigeon	4	3
Com. Goldeneye	4	6
Lesser Scaup	6	1

Table 4
Five most frequently recorded warblers

	Smith	Erskine
Tenn. Warbler	1	3
Yel.-rmpd. Warbler	2	—
N. Waterthrush	3	4
Yellow Warbler	4	1
Ovenbird	5	2
B.&W. Warbler	—	5

Table 5
Five most freqently recorded fringillids

	Smith	Erskine
Wh.-thr. Sparrow	1	1
Chipping Sparrow	2	5
Dark-eyed Junco	3	3
Rose-br. Grosbeak	4	—
Song Sparrow	5	4
Lincoln's Sparrow	—	2

In spite of these inherent problems, it is interesting to note the similarity in the two studies if the birds are broken down into groups (Tables 3, 4, 5). It will be interesting to see if changes occur in these groups as more studies are done in the area.

[1] AMERICAN ORNITHOLOGISTS' UNION. 1957. *Check-list of North American Birds.* Fifth Edition. 691 p.

[2] BAKER, B. W., and L. H. WALKINSHAW. 1946 *Birds Notes from Fawcett, Alberta.* Can. Field-Nat. 60:5-10.

[3] EATON, S. W. 1948. *Bird distribution along the Peace, Slave and Little Buffalo Rivers of Canada.* Auk. 65:345-352.

[4] EISENMANN, E. 1973. *Thirty-second Supplement to the American Ornithologists' Union Check-list of North American Birds.* Auk. 90:411-419.

[5] ERSKINE, A. J. 1968. *Birds observed in north-central Alberta, summer 1964,* Blue Jay 26;24-31.

[6] GODFREY, W. E. 1952. *Birds of the Lesser Slave Lake-Peace River areas Alberta.* Nat. Mus. Canada Bull. 126:142-175.

[7] PREBLE, E. A. 1908. *A biological investigation of the Athabasca-Mackenzie region.* U.S. Biol. Surv., N.A. Fauna, No. 27:574 p.

[8] ROWE, J. S. 1972. *Forest regions of Canada.* Dept. of the Environment, Can. Forestry Service Publ. No. 1300, 172 p.

[9] SOPER, J. D. 1949. *Birds observed in the Grande Prairie-Peace River region of northwestern Alberta, Canada.* Auk 66:233-257.

[10] WILLIAMS, M. Y. 1922. *Biological notes covering parts of the Peace, Liard, Mackenzie and Great Bear River basins.* Can. Field-Nat. 47:23-31.

FIRST DUNLIN AND WESTERN TANAGER FOR RIDING MOUNTAIN NATIONAL PARK, MANITOBA

by W. J. WALLEY*

DUNLIN. Lack of shore bird habitat in Riding Mountain National Park has resulted in the identification of relatively few species of this suborder of the Charadriiformes. Of 32 species of shore birds which are known to occur regularly in Manitoba, either as summer residents or migrants, only 22 had been listed for the park prior to this sighting of the Dunlin. Of these, 12 have been classified as being very rare.[4 5]

At approximately 9 a.m. on November 3, 1973, I identified and photographed the only Dunlin ever recorded for Riding Mountain National Park when one, was seen on the north shore of Clear Lake. The temperature that clear, calm morning was -10.5° C. About 6 inches of snow covered the ground. Except for small isolated areas of shallow water close to and at the edge of the shore, ice had formed for about 50 to 60 feet out into the lake. Visibility beyond the edge of the ice-water interface was very poor due to the mist which was rising from the lake.

The bird was first noticed as it foraged in the shallows. Shore birds are often difficult to identify, especially in fall plumage. However, the rather long decurved bill observed in this bird eliminated most species and the unpatterned grey back and grey suffusion across the breast described for the Dunlin in fall and winter plumage by Godfrey were also observed in this bird.[3] Bent states that some writers have noted that Dunlins are nervous and active while feeding, but he found that they were sluggish and inactive and easily approached.[1] The bird seen on November 3 was extremely active and seemed to be frantic in its search for food. With a careful approach I was able to come to within 8 feet of it. Ice was observed on its outer tail feathers causing them to bend downward when the tail was otherwise held in a horizontal plane. Suddenly it took flight into the mist giving alarm calls, only to return to the same spot in a few minutes and resume foraging.

This bird was doubtless a straggler as Bent states that the southern migration separates into two widely divergent routes with only stragglers in between.[1] One route is southward along the Pacific coast; the other is southeastward along the west coast of Hudson Bay, then across the eastern Great Lakes to the New England coast

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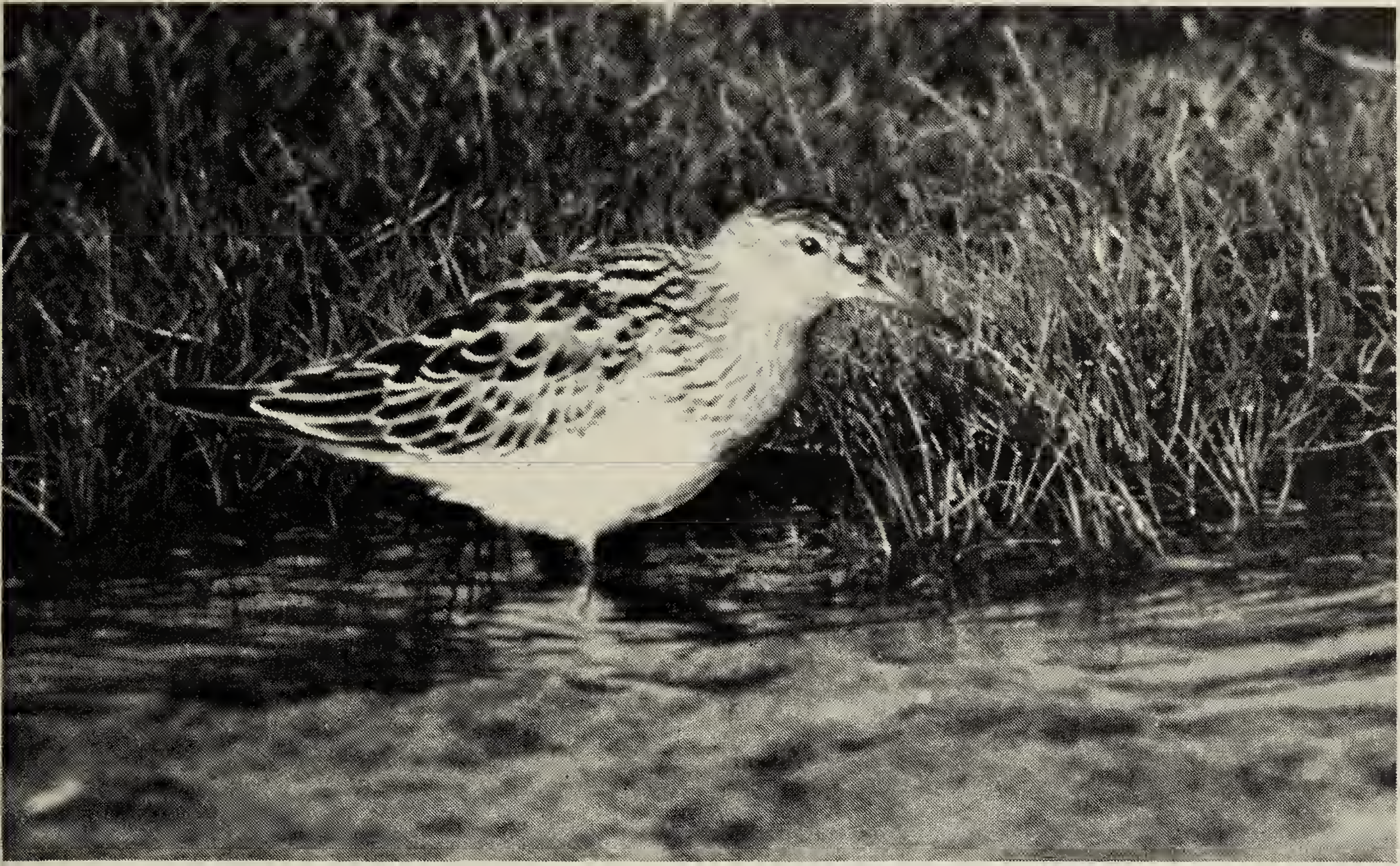

Pectoral Sandpiper, Herschel Island, Y.T. M. A. Gollop

and south. He further states that the Dunlin seems to be a rare bird in fall migration in the interior provinces of Canada and that his Manitoba correspondents had no fall records. However, the sighting at this time of year may not be so unusual as Wayne notes that the Dunlin is a very hardy bird — not appearing to be affected by temperatures as low as 6° F. (-14.4° C.).[6] Furthermore, Bent does give a previous late date of fall departure from Manitoba — October 31 at Lake Winnipeg.[1] According to Godfrey, this holartic species winters from Alaska to Baja California on the west coast and from Massachusetts to Florida and the Gulf Coast in the U.S.A.[3]

WESTERN TANAGER. On Sunday, May 25, 1975 the Dauphin-based Intermountain Naturalists Society combined a spring canoeing and bird migration observation trip near the isthmus between Clear and South lakes in Riding Mountain National Park. The isthmus, which is about 1/2 mile in length and from 20 to 100 feet in width, is an excellent area in which to observe birds, especially warblers in spring migration. However, on this day strong southwesterly winds caused the birds to seek shelter in the woods at the east and west sides of the isthmus.

Prior to canoeing, a short excursion was made into the woods on the west side of the isthmus. It was just after 11 a.m. when Joan Wells spotted a different bird and turned our attention to it. It was in an aspen less than 20 yards away and about 20 feet up. With its back toward us we could see that it was basically yellow, though not a brilliant yellow such as is seen in many of the warblers. It had black wings with two distinct light wing bars and a black band over the back. We did not notice that the wing bars were a light yellow, probably because we observed the shaded side of the bird only. Suddenly it turned on the branch and faced us. The reddish head and throat that it displayed indicated that it was either a Western Tanager or a female Scarlet Tanager — I was not that familiar with these birds. After perching for about

20 seconds it flew off through the trees along the lakeshore toward the isthmus. About 65 yards away it perched. As we began our approach the bird took flight again and it was at this time that I believed I saw 2 yellow birds with black back bands. I did not confuse these with female Northern (Baltimore) Orioles which were also in the area. Upon checking our field guides, the male Western Tanager was confirmed — the first record of this species occurring in the park. Then Judy Walley said that she had definitely seen 2 of these birds when they were first seen perched, but one did not have the red on the head and throat. However, she could not remember seeing wing bars hence there is a possibility that the other bird she saw was a female Scarlet Tanager, but her experience in birding has been limited and she says she may have overlooked the presence of wing bars. From the observations made, there may have been as many as 3 Western Tanagers — 2 males and a female but we could not be sure. The sighting of the male was the only positive identification.

Cuthbert observed a male Western Tanager in the Carberry Spruce Woods area of Manitoba on June 16, 1973.[2] He also cited the records of the late A. J. Lawrence from "Chickadee Notes" in the *Winnipeg Free Press*. These included pairs seen at St. Vital, Brandon and Starbuck in June, 1933, July, 1938 and early July, 1963, respectively. Sightings of single birds have been made at Ponemah and Winnipeg.

ACKNOWLEDGEMENTS. I would like to thank Ron Rutledge, Park Naturalist, for providing information on the temperature at Clear Lake for November 3, 1973.

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[1] BENT, A. C. 1929 (Dover Edition 1962). *Life histories of North American shore birds.* U.S. Nat. Mus. Bull. 146.

[2] CUTHBERT, CALVIN. 1974. *Western Tanager sighting in Manitoba.* Blue Jay 32:241-242.

[3] GODFREY, W. E. 1966. *The birds of Canada.* Natl. Mus. of Canada Bull. 203, Ottawa. 428 pp.

[4] MANITOBA MUSEUM OF MAN AND NATURE. 1974. *Field check list of Manitoba birds.* Manitoba Museum of Man and Nature, Winnipeg.

[5] PARKS CANADA. 1974. *List of birds Riding Mountain National Park.* Dept. of Indian Affairs and Northern Development, Canada.

[6] WAYNE, A. T. 1910. *Birds of South Carolina.* Contributions from the Charleston Museum No. 1. (In Bent, A.C. 1929. Life histories of North American shore birds. U.S. Nat. Mus. Bull. 146).

SASKATCHEWAN CHRISTMAS BIRD COUNT 1975

List the number of each bird species seen on the one best day from Saturday, December 20, 1975, through Sunday, January 4, 1976. Each area should be a circle, 15 miles in diameter. See the March, 1975, *Blue Jay* for examples and details. Send reports as soon as possible and by January 12, 1976, at the latest, to

Mrs. Mary Houston,
863 University Drive,
Saskatoon, Sask. S7N 0J8.

CHRISTMAS MAMMAL COUNT 1975

For the 3rd year, Wayne Harris will be compiling reports of mammals seen during the Christmas Bird Counts. When making your Christmas Bird Count, please note the number of each species of mammal seen and the species of tracks that you can positively identify. Last year 16 of the 44 bird counts reported 15 species of mammals. Send the results to Mary Houston, 863 University Drive, Saskatoon, S7N 0J8, by January 12, 1976.

FIFTEENTH ANNUAL NESTBOX REPORT OF THE BRANDON JUNIOR BIRDERS — 1975

by Mrs. JOHN LANE* and SEAN BLACK**

During the winter months of 1975, very little field work was accomplished because of the heavy snowfall. The Juniors met several Saturday mornings to build nestboxes and on two other occasions, they gathered for an educational and social time. New members were introduced and adult helpers, Mr. W. E. Forsythe, Mr. H. Watson and Mr. John Plum, were invited. Mr. Forsythe continues to donate a steady supply of good boxes and Mr. Plum still rounds up quantities of building materials. During one of the get-togethers, Mrs. Lane presented an illustrated talk to the boys on the life of Ernest Thompson Seton, stressing his love of the Carberry spruce woods and sandhill areas, where now many of the Junior Birders' most productive nestlines are located.

Due to the illness and subsequent death of John Lane, a large segment of the bluebird nestlines was neglected this summer. However, some good early spring field trips were enjoyed during which 5 nestboxes were replaced, 43 new bluebird boxes and 6 Wood Duck boxes were set out.

May 17 and May 19 were the last field trips of the Brandon Junior Birders with their director. On these 2 full-day outings, 9:00 a.m. to 4:30 p.m., much work was accomplished, including the moving of boxes from the Trans-Canada Highway east of Brandon, where four lanes are being constructed.

The regular helpers had a busy summer and have sent in their reports which are greatly appreciated. Mr. and Mrs. Ed Robinson, Wawanesa, report 58 Mountain Bluebird nestings and 2 Eastern Bluebird nestings. An interesting highlight on their nestline was the unusual behaviour of a male Mountain Bluebird. This bird would respond to Mr. Robinson's whistle and fly to him, alighting on his head or his hand repeatedly throughout their visits.

Mr. and Mrs. Art Michie, Souris, reported 74 Mountain nestings and no Eastern nestings. Again there was a recurrence of black flies (*Simulium venustum*) causing 31 deaths of nestlings.

Mr. and Mrs. Les North, Pratt, reported 25 Mountain Bluebird nestings and 1 Eastern.

Mr. and Mrs. Jim Spear, Russell, found 41 nestings of Mountain Bluebirds, 2 Eastern, and 1 crossbreeding (Mountain male x Eastern female).

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Mountain Bluebird at Kargut box. R. J. Long

At a meeting called in mid-August by the Brandon Natural History Society and members of the Science department of Brandon University, and chaired by Dr. R. K. Lane, Edmonton, Alberta, a plan was initiated to carry on the work of the late John Lane and his Junior Birders. Volunteers committed themselves to care for allotted portions of the extensive nestlines, to keep records and, in some areas, to promote scientific research.

These volunteers, including Junior Birders, made some early fall checks, but because of the date, could not be specific as to the species of bluebirds. However, from the nature of vacated nests, they could be identified as bluebird nestings and for this year are listed merely as bluebird nestings.

Two Junior Birders, Chris Martin and Tony Burton, checked old No. 1 Highway Carberry — 15 bluebird nestings. On the Carberry-Glenboro and Minnedosa-Erickson lines, Tony listed 34 bluebird nestings. Barbara Robinson, Brandon, reported 66 bluebird nestings in the Camp Hughes area. Northwest of Brandon in small areas, Rivers and Hamiota, Mr. and Mrs. R. H. Patmore, Brandon, reported 4 bluebird nestings. From the Austin-Holland line, volunteers Mr. and Mrs. Wayne Brown, Austin, sent in their late fall findings of 21 bluebird nestings. The A. M. Bauman family of Brandon reported 3 Mountain Bluebirds and 1 bluebird nesting on No. 10 line south of Brandon.

The total number of nestboxes checked for 1975 by regulars and volunteers was 789. A summary of the occupants shows: Mountain Bluebirds 201; Eastern Bluebirds 5; cross breeding 1; Bluebirds (either species) 141; Tree Swallows 251; House Wrens 14; House Sparrows 74; mice 37; Starlings 2; grain 2; empty 37; vandalized 24.

If the good fall weather holds, large portions of the neglected nestboxes will be cleaned out by volunteers, ready for an active summer in 1976.

The Junior Birders were represented by Chris Martin and Daryl Neustater at the 93rd Stated Meeting of the A.O.U. at the University of Manitoba, Winnipeg, Their display showed the growth of their club's work through 15 years. Dr. David Krieg of State University, New York, presented his paper, "Species-recognition: Behaviour of Territorial Eastern and Mountain Bluebirds". The research was the result of studies done on our nestlines.

EASTERN PHOEBES IN BIRCH HILLS MUNICIPALITY

by MOE MARESCHAL and STUDENTS*

This Biology 20 project was inspried by J. A. Wedgwood's article on nighthawks in the *Blue Jay* of June, 1973. The Eastern Phoebe has been observed relatively frequently in the past in our area and it was decided to investigate the frequency of this bird in 1975. To do this we searched nesting sites in abandoned farms and under bridges. A large part of the Birch Hills Municipality was subdivided and one group was assigned to each division.

Group 1: Linda Stobbs and Cheryl Rude. Our first trip was made on June 11. In this trip we covered 42 miles and looked in 11 places, most of them containing more than one building. On the outside of one large house, under a roof ledge, we found a phoebe nest containing three young. We saw the mother there also. In a couple of bins and old houses we found six Barn Swallow nests. We did not check the nests for contents. We also checked six bridges and saw birds flying out.

On Saturday, June 14, we tried to check the nests under the six bridges but the water was too deep. We checked a seventh bridge but no nests or birds were found (22 miles).

On Monday, June 16, we again checked six bridges and observed the birds we scared out. At two different bridges we saw two phoebes. Other birds we saw included Barn Swallows and sparrows. We could hear baby birds but could not see the exact location of the nests (15 miles).

We covered a total of 79 miles or approximately 20 square miles.

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*Cheryl Rude, Linda Stobbs, Kathy Haug, Bev Miller, Debbie Braaten, Donna Silde, Bonnie Hovdebo, Lynn Njaa and Donna Kormish.
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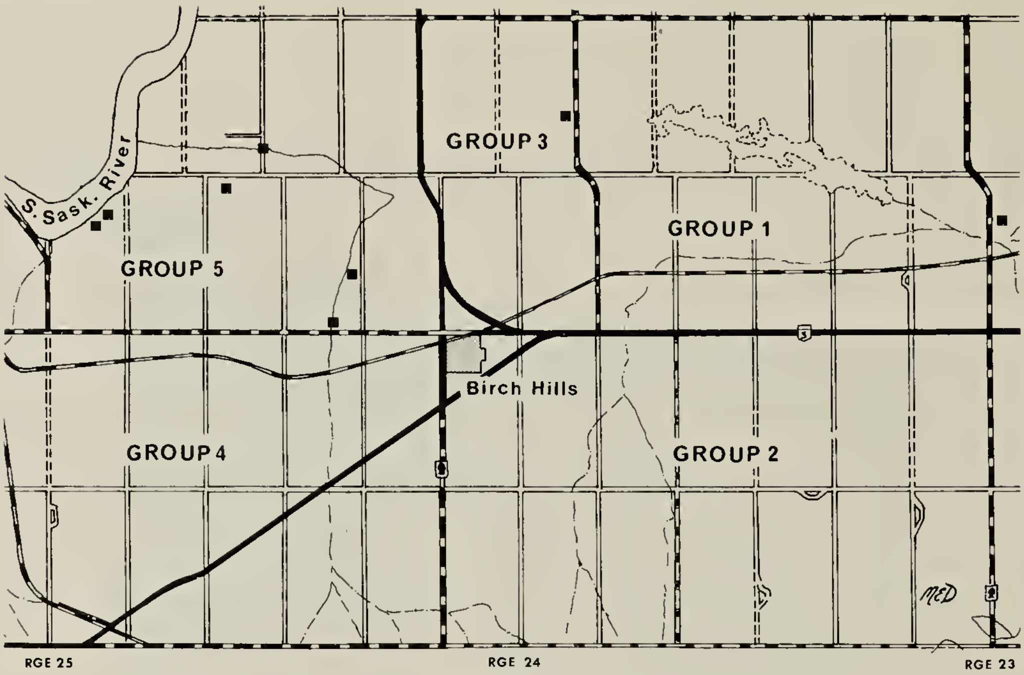


Group 2: Kathy Haug and Bev Miller. The area we were to cover was 28 square miles and within this area we drove 43 miles. We went to 10 farms which had old buildings. The other farms in our block were occupied and were, therefore, out of the scope of our investigation. We didn't find any nests because most of the buildings were boarded up.

Group 3: Debbie Braaten, Donna Silde and Bonnie Hovdebo. The area that we covered was 8 square miles. In this area we covered 17.5 miles by road. We went to 10 different places, and found one phoebe nest, which had three nestlings in it. We also found several Barn Swallow nests every place we went.

The phoebe nest was found on a rafter about a foot down from the ceiling. The building was about 7.5 feet at its peak, and it was damp and dark inside.

Group 4: Lynn Njaa, and Donna Kormish. Our area was 24 square miles. We drove about 23.5 miles. We stopped at 10 places and at one bridge. We found no evidence of phoebes or their nests. We did find one Barn Swallow nest.

Group 5: Moe Mareschal and family. This group covered 29 square miles and went 18 miles by road. We investigated five abandoned farms and two bridges. We found four phoebe nests at the farms. Each of two nests had four young in them and the other two nests had four eggs each. At one of the bridges we found a vacated phoebe nest. We also found five Barn Swallow nests.

Conclusion: During the interval from June 12 to 20, 1975, we went to a total of 46 abandoned farms and looked under 10 bridges. We drove a total of 181 miles, which represented approximately 109 square miles searched. We found two phoebe nests with three young each, two phoebe nests with four nestlings each, and two phoebe nests with four eggs each. We also found two phoebe nests under bridges where young were heard but not seen. Also one vacated nest was found. There was a total of 9 nests, more than 14 young birds, and 8 eggs.

In addition, 15 Barn Swallow nests and one Robin nest were found.

It is certain that some phoebes must have been missed, but the project at least gives some indication of the nesting density of phoebes and their dependence on old buildings and bridges for nesting sites.

The accompanying map indicates the approximate locations of the nests.

PLEISTOCENE PRAIRIE DOG IN SOUTH-CENTRAL ALBERTA

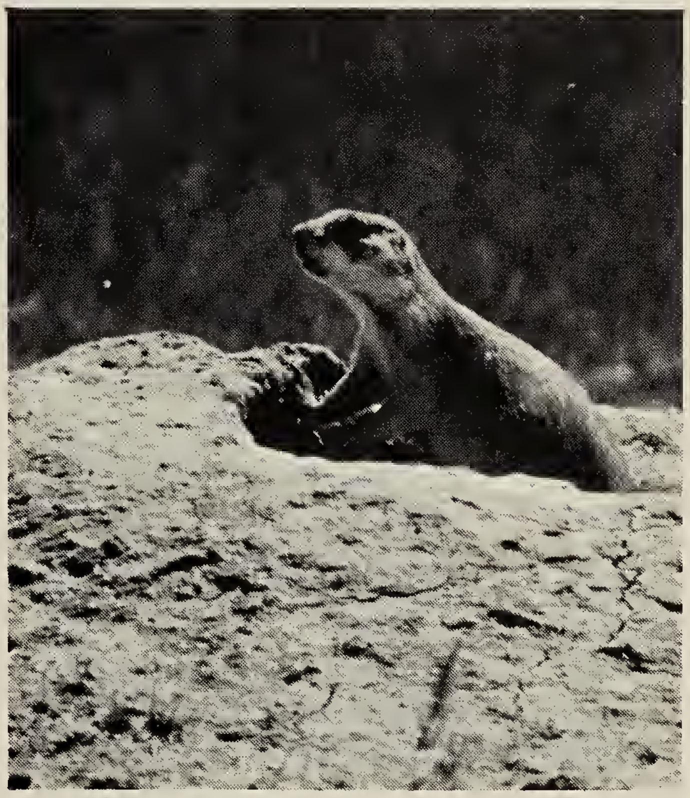
by JOHN E. STORER*

On 30 June, 1975, Linda J. Strong and I collected a well-preserved right mandible of a prairie dog (Provincial Museum of Alberta registration number P75.7.1) from the Hand Hills Formation south of Delia, Alberta. The jaw contains the lower cheek-teeth (P_4 to M_3: Length of cheek-tooth series 14.1 mm), and was discovered in bulldozed material of a gravel pit (Lsd. 16 Sec. 16 T30 R17 W4).

The specimen is not distinguishable from the living black-tailed prairie dog (*Cynomys ludovicianus*), as indicated by comparison with modern specimens in the University of Alberta and Provincial Museum of Alberta.

Cynomys ludovicianus was not present in the previously reported Pleistocene fauna from the same locality.[3] [4] The fossil record of *C. ludovicianus* spans Kansan to Recent time,[1] the addition of this species does not allow more precise assignment of age to the Hand Hills Pleistocene fauna, which was estimated to be Irvingtonian (late Kansan) or younger.[3] [4]

The Hand Hills lie about 225 mi. (410 km) northwest of the nearest modern occurrence of black-tailed prairie dogs, near Val Marie, Saskatchewan. As noted by Stalker and Churcher for two faunas near Medicine Hat, the presence of *Cynomys* indicates that the Pleistocene fauna of the Hand Hills may have lived in a climate somewhat warmer and drier than prevails there today.[2]



Black-tailed Prairie Dog. G. W. Seib

[1] HIBBARD, C. W. 1970. *Pleistocene mammalian local faunas from the Great Plains and Central Lowland provinces of the United States.* In Dort, and Jones, J. K. (eds.). *Pleistocene and Recent environments of the Central Great Plains.* Dept. Geol., Univ. Kansas, Spec. Publ. 3. University Press of Kansas, Lawrence/Manhattan/Wichita. p. 395-433.

[2] STALKER A. MACS., and C. S. CHURCHER. 1970. *Deposits near Medicine Hat, Alberta, Canada.* (Chart). Surveys and Mapping Branch, Geol. Surv. Can.

[3] STORER, J. E. 1972. *Mammals of the Hand Hills Formation of southern Alberta: preliminary faunal list.* Blue Jay 30: 119-120.

[4] STORER, J. E. 1975 (in press). *Mammals of the Hand Hills Formation, southern Alberta.* Life Sci. Contr., R. Ont. Mus.

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*Provincial Museum of Alberta,
Edmonton, Alberta.
T5N 0M6

ROAD KILL FREQUENCIES

by RICHARD L. COULTON*

In the June, 1975, *Blue Jay,* James Donovan reported wildlife road kills near Whitewood, Saskatchewan, during July, 1974.[1] In a distance of 560 miles, 112 individual kills were observed, averaging 1 kill per 5 miles.

After reading Donovan's paper, I wondered how applicable this rate was throughout the Prairie Provinces and I tested this in August, 1975, by having an observer in the car with me note wildlife kills as we travelled western Alberta highways. Table 1 indicates the routes taken, dates, mileage and number of kills observed.

Since some observed kills would have occurred the previous day, it is to be expected that our road kill frequency would be somewhat greater than Donovan's, provided, of course, that his indicated rate of one per 5 miles is fairly typical. This proved to be close to our findings: one per 3.9 miles. The results of our observations are given in Table 2.

It is of interest to note that, in both cases, ground squirrels constitute the largest single group of fatalities, while in our study crows formed a much greater percentage of the total (15%) than in Saskatchewan (3%).

Richardson's Ground Squirrel.
G. W. Seib

It is highly probable that, like Donovan, I also missed a considerable number of individuals which may have been knocked off the road, or were eaten before being observed, or disintegrated. I feel that the true rate of wildlife mortality on highways is far higher than these observations suggest.

My observations suggest that Donovan's sample was indeed a typical one, and that the frequency of road kills throughout the prairies is commonly in excess of an average of one kill per 5 miles each day.

Table 1
HIGHWAYS OBSERVED IN WESTERN ALBERTA

Route	*Miles*	*Date*	*Number o Kills Observe*
Bentley - Lacombe	15	August 5	9
Lacombe - Stettler	53	August 5	12
Sylvan Lake - Bentley	11	August 13	3
Lacombe - Alix	28	August 21	4
Sylvan Lake - Bentley	11	August 27	1
Sylvan Lake - Bentley	11	August 29	4
Sylvan Lake - Bentley	11	August 31	2
Sylvan Lake - Eckville	14	August 31	4
TOTALS	154		39

---

*Bentley, Alberta.
T0C 0J0

Table 2
ROAD KILLS IN WESTERN ALBERTA

Richardson's Ground Squirrel	13
Porcupine	4
Crow	6
Magpie	2
Pintail	1
Small unidentified mammals (mouse size)	4
Small unidentified birds (sparrow size)	8
House Cat	1
TOTAL	39

I would like to thank Doris Coulton of Bentley and Cameron MacGregor of Red Deer for acting as observers on some of the journeys involved.

---

[1] DONOVAN, JAMES. 1975. *Wildlife Road Kills.* Blue Jay 33:120.

30 Years Ago

From the October-December, 1945, *Blue Jay* comes the following report by Cliff Shaw, entitled, "A Wasp Episode":

On the Labour Day weekend, while hunting arrowheads on a sand blow along the Assiniboine, we watched one of the digger wasps hard at work.

When first noted the wasp had just begun to excavate a vertical shaft in the fine loose sand. The insect, black and scarcely half an inch in length, was rapidly digging similar to the manner in which a dog digs for a gopher. Working from one spot, the sand flew from between her front feet and was tossed fully 3 to 4 inches behind her, over the edge of the hole. As the incline became more steep and sand tumbled to the bottom of the hole, she would run backwards up the side and begin a new trough about an inch from the rim.

When the funnel-shaped hole was about 3 inches deep, and approximately the same in diameter, the wasp uncovered a smooth green caterpillar, apparently still alive.

Turning the larva over on its side the wasp grasped it by the head and pressed her abdomen against its thorax. We could not observe whether the wasp was administering a sting to paralyse the larva or was depositing an egg. This action was repeated several times.

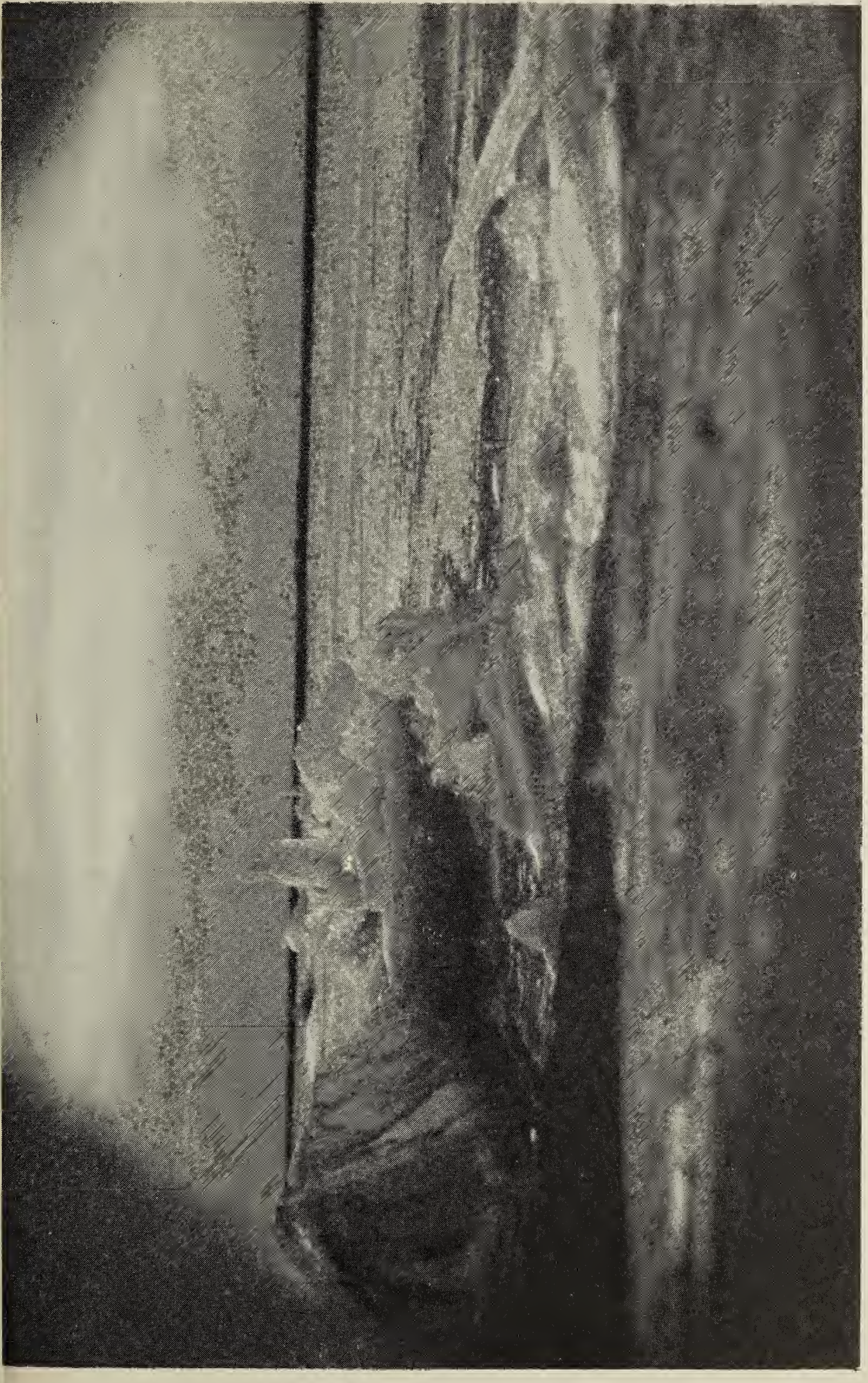
Although the caterpillar was many times her own weight and over an inch in length, the wasp dragged it out of the hole. Then she got astride it! The wasp reminded us of a small plane with an oversized bomb load, the caterpillar being almost three times her own length.

By some unseen method the larva was underslung to the body of the wasp — probably being held in her strong mandibles. Running on all legs, the wasp struck out rapidly across the sand blow. Whenever she met an obstruction in her path she would drop the caterpillar and scout the possibilities of an easier route. At every 10 or 15 feet she would stop for a rest, remaining astride the larva.

After watching the wasp carry her heavy load for 40 or 50 feet, we lost sight of her when she ran into a clump of grass.

WINTER MOODS

by JOHN P. HATFIELD



THE BIRDS OF MANITOBA

By Ernest E. Thompson

Second edition published
by Premium Ventures Ltd.,
235 Garry St.,
Winnipeg, Man.
187 pp. August 1975.
$5.00 direct from publisher.

The republication after 84 years of *The Birds of Manitoba* by Ernest E. Thompson, better known as Ernest Thompson Seton, is a landmark event. The decision to republish resulted largely from the enthusiasm and determination of Mrs. Ardythe McMaster, chairman of the exhibits committee for the 1975 annual meeting of the American Ornithologists' Union, held in Winnipeg. This is a photo-lithographic reproduction of the separate volume published in June, 1891. The reprint contains an informative one-page introduction by Robert W. Nero.

It is most appropriate that this reprint appeared for the first A.O.U. meeting in Manitoba and the second in western Canada. Seton was one of the first 87 Associates elected at the founding meeting of the A.O.U. in New York City on September 26, 1883, and Seton attended the third annual meeting, also in New York, on November 18, 1885. Seton was an important early contributor to *The Auk*. In its first volume (1884), he reported the first recorded nest of the Connecticut Warbler, found in a swamp south of Carberry, Manitoba. In Volume 2 (1885), Seton contributed four articles. When a new class of member (now called Elective Member) was established in 1901, Seton was in the first group to be elevated to this rank. He maintained his A.O.U. membership continuously over 63 years, until his death in 1946. Seton collected notes from all known amateur naturalists of the time, including George F. Guernsey of Fort Qu'Appelle (Saskatchewan). Most of these observations would not have been published, much less preserved, had it not been for Seton. Seton also persuaded Professor John Macoun (Botanist for the Geological Survey of Canada) to provide him with his observations, "specially revised and corrected", in much greater detail than Macoun was to use later in his own *Catalogue of Canadian Birds*, 1900-1909. Especially important are Macoun's observations from the Etomami, Swan and Assiniboine Rivers within present-day Saskatchewan.

In Volume 3 of *The Auk* in 1886, Seton published a 22-page annotated list of 257 species from Manitoba, with a 258th species added in a one-page supplement later that year. Thanks to Seton's compilations, no other area on this continent has a more complete record of bird life as it changed in the first years of settlement. The detailed accounts of the rapid spread with settlement of the Greater Prairie Chicken (Pinnated Grouse), Mourning Dove and Eastern Bluebird are particularly valuable, as are the details of the first nests ever found of the Connecticut Warbler and Philadelphia Vireo, the latter near his homestead at Runnymede, Saskatchewan. Interesting items abound, including the discovery of both species of Wood Pewee on the western slope of the Duck Mountains and the influx of Hawk Owls into the Carberry area in the fall of 1884.

When J. A. Allen reviewed *Birds of Manitoba* in 1891, he noted that: "Many of [Seton's] own notes are given as actual transcripts from his field journal, and have thus the freshness and inspiration of direct contact with nature." This is very true; a few examples are Seton's first-hand accounts of the Black Tern, American

Bittern, Common Snipe, Sharp-tailed Grouse, Swainson's Hawk, Great Horned Owl, Nighthawk, Eastern Kingbird, Meadowlark, Lapland Longspur and Clay-colored Sparrow.

Seton seems to have made no errors in identification of specimens collected, with the exception of the "Acadian Flycatcher", which was probably a Traill's Flycatcher. The reports of Barrow's Goldeneye provided by Hunter and Hine are questionable.

There is a real problem in trying to assess frequency of occurrence from the terms used — extremely abundant, abundant, common, tolerably common and rare. "Rare" or "very rare", when used by Seton, usually meant a single record only. "Tolerably common", sometimes interchanged with "somewhat common", meant only one or two pairs, and must be interpreted in modern terminology as "uncommon". Seton tended to use superlatives such as "extremely abundant" where other observers such as Macoun and Guernsey would use "abundant" and "abundant" where they would use "common. As a further complication, Seton changed his terms for a number of species between his 1886 and 1891 lists.

The reader must be warned about the very unsatisfactory punctuation of the original printing, reproduced exactly in the reprint. The first statement for most species is a general statement pertaining to the entire province of Manitoba; this obviously should have been followed by a period. Instead, for most species, except near the end of the publication, there follows a semicolon, and then the observations from Pembina of Dr. Elliott Coues. Thus at first glance the whole first sentence might be thought to represent Coues' observations, a rather serious source of confusion for the casual reader.

There are a disappointing number of typographical errors throughout the publication. In his autobiography, *Trail of an Artist-Naturalist*, Seton tells of his disappointment that the galley proofs were not sent to him in Paris, France, where he was studying art: ". . . the resultant publication, instead of being my joy and pride, came out overflowing with errors and misprints that have made it one of the dark spots in my memory ever since."

Many of the typographical errors were trivial spelling slips, but there are two misleading errors in dates in the Bibliography and a few undoubted errors in the dates for observations. Macoun's Great Blue Heron was shot on the Swan River on 28 August, not 28 April of 1881 and Macoun's Avocet from the "base of the Coteau" (south of Moose Jaw) is variously given as 25 and 28 July in Seton's two lists.

In one respect, it is perhaps a pity that the republication had to be rushed for the A.O.U. meeting. It would have been nice to include an extra page or two listing Seton's Carberry migration dates given only in his first paper. Even more useful would have been his 1893 paper in Volume 10 of *The Auk*, telling of the changes in bird life noted when he returned to Carberry in 1892.

Republication of Seton's classic will allow everyone access to Manitoba's rich heritage of early bird records.

Since birds are accurate indicators of environmental change, we can hope that better understanding of the past will assist better preservation of our dwindling habitat in future. At this low price, no one can afford to be without a copy of this important book. — *C. Stuart Houston*, 863 University Drive, Saskatoon, Saskatchewan. S7N 0J8.

Upland Sandpiper

NEW NATURAL HISTORY BOOKS 1974-75

by SHEILA PURSE*

(Call letters are for the Saskatoon Public Library)

ALLEN, Thomas B. *Vanishing wildlife of North America*. 1974. 207 p. A provocative text enhanced by superb photographs, many of them as rare as the dwindling wildlife they portray.
591.042 A431

BANFIELD, A. W. F. *The mammals of Canada*. 1974. 438 p. A richly illustrated work providing an authoritative account of Canada's mammals. (Another copy in reference)
599.0971 B215

BARKER, Harriett. *The one-burner gourmet*. 1975. 288 p. A guide for preparing outdoor meals for campers, hikers or canoeists.
641.578 B255

BAUER, Erwin A. *Hunting with a camera; a world guide to wildlife photography*. 1974. 324 p. A combination of Bauer's incomparable photographs and practical information intended to help you take good wildlife photos yourself.
778.932 B344

CALLAHAN, Philip S. *The magnificent birds of prey*. 1974. 190 p. The lives of falcons, eagles, owls and other birds of prey with special emphasis on their flight, means of communication, social behaviour and territories.
Y598.91 C156

CARAS, Roger A. *The venomous animals*. 1974. 64 p. A noted naturalist explores the little-known world of self-preservation of plants and animals from the tarantula to poison ivy.
Y591.69 C261

DALTON, Stephen. *Borne on the wind*. 1975. 159 p. Magnificent photographs of insects in flight accompanied by descriptive essays.
595.7018 D152.

DARY, David A. *The buffalo book*. 1974. 374 p. An extensive treatment including its origins, habits, significance, near demise, salvation, and folklore.
599.7358 D228

DAVIS, Bette J. *The world of mosses*. 1975. 64 p. A study of the life cycle, growth patterns, varieties and importance of mosses.
Y558.2 D261

DILLARD, Annie. *Pilgrim at Tinker Creek*. 1974. 271 p. Anecdotes and bizarre bits of information highlight one year of exploration of nature in the author's own neighbourhood.
500.97559 D578

EAST, Ben. *The last eagle; the story of Khan*. 1974. 144 p. The story of the birth, flight, migration, mating, and finally death of the Bald Eagle.
598.91 E13

FEGELY, Thomas D. *The world of the woodlot*. 1975. 126 p. The small patches of woodland that have survived the destruction of our vast forests continue to provide an important haven for many plants and animals.
Y574.5264 F295

FOGDEN, Michael. *Animals and their colours: camouflage, warning colouration, courtship and territorial display, mimicry*. 1974. 172 p. A beautiful book explaining the nature of animal colour and the various ways animals use colour.
591.57 F655

FRISCH, Karl von. *Animal architecture*. 1974. 306 p. The marvels of instinct and inventiveness among insects, birds and mammals are revealed in their creative building activity.
591.56 F917

MILNE, Lorus J. *Because of a flower*. 1975. 152 p. Discusses various plants that provide centers for small communities of animal life attracted by their flowers, fruits and seeds.
Y583 M659

ROOTS, Clive. *Animals of the dark*. 1974. 199 p. The special habits and adaptations which enable certain animals to cope in darkness.
591.5 R783

RYDEN, Hope. *God's dog*. 1975. 288 p. A firsthand account of the author's adventures studying and photographing the elusive coyote.
599.74442 R992

STEWART, Darryl. *Canadian endangered species*. 1974. 174 p. The eighty-three species and subspecies of mammals, birds, reptiles and amphibians of Canada that are rare and endangered.
591.042 S849

STOUT, James H. *Backpacking with small children*. 1975. 223 p. The pleasures and problems of camping with children, with special attention to children's clothing and equipment.
796.51 S889

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CLIFF SHAW AWARD

The Cliff Shaw Award for 1975 goes to Arlean McPherson of Saskatoon for her article on Cedar Waxwings in the December, 1974, issue of *Blue Jay*. Arlean has been interested in both nature and photography in a casual way for some time. However, when the opportunity presented itself in her backyard, she took advantage of it, keeping daily notes on the behaviour of both adult and young waxwings and photographing them regularly. She then wrote a delightful and informative account of her enjoyable experiences. Would that more readers would follow her example. Our congratulations on her achievement.

1975 CONSERVATION AWARD

Since birds are a sensitive indicator of the environment, the exemplary documentation of the bird life of the Rosetown-Biggar area, sparked by *Wayne Renaud* was the basis of his being given the 1975 Conservation Award of the Society.

LOOKING BACK

At the conclusion of another volume I want to thank contributors for their efforts and hope that readers have found more than enough of interest over the past year to renew their subscription — in spite of an increase in the subscription rate. I also want to thank the volunteers who helped put each issue together. My thanks to Bob Nero and Vern Harms who conscientiously handled the time-consuming job of editing manuscripts. Thelma Pepper, Molly Denson, Jean Meston and Bill Richards proofread material, usually on short notice. Ann Jeffries who composed the first two issues for this year and Ed Driver the last two, have my gratitude. Ed also proofread and edited throughout the year and handled most of the other editorial details for the June issue. Lorne Scott and his assistants ably handled the distribution of about 2500 copies of each issue.

In spite of all the above co-operation, 1975 has been a rough year — particularly for authors and readers. My apologies, first and foremost, to authors for my not living up to promises made a year ago regarding sending galleys, for errors in printing and for lack of correspondence about manuscripts. My apologies also to readers for late issues and, again, for not acknowledging correspondence. Having decided that I fall far short of being an adequate editor, I have submitted my resignation. If you can be patient for one or two more issues, the situation should improve significantly.

One more word to contributors: a few authors have articles printed in the issue following their submission but most have waited two, three and even four issues to see the results of their work. My selection has been influenced by the amount of material, length of article, suitability for a particular season and compatability with other articles on hand or in preparation. Thank you for your patience.

The coloured plate in this issue was made possibly by a donation of $500. Hopefully, the increased subscription rate will permit one or more coloured pages in the coming year.

SASKATCHEWAN NATURAL HISTORY SOCIETY
Financial Statement — Year Ending September 30, 1975

INCOME			
Memberships (including sales of *Blue Jay*)		$ 7,308.22	
Memberships (extra re: supporting and sustaining)		2,450.48	$ 9,758.70
Spec. Pub. No. 1 Guide to Sask. Mammals	$ 20.35		
Spec. Pub. No. 2 Birds of Sask. River	Out of print		
Spec. Pub. No. 3 Birds of Regina	9.40		
Spec. Pub. No. 4 Blue Jay Index (1942-60)	20.00		
Spec. Pub. No. 5 Birds of Lake Athabasca	40.75		
Spec. Pub. No. 6 Birds of N.E. Saskatchewan	28.20		
Spec. Pub. No. 7 Birds of Moose Mountain	24.90		
Spec. Pub. No. 8 Blue Jay Index (1961-69)	98.00		
Spec. Pub. No. 9 Birds of Rosetown-Biggar	120.00		
Publication — Hours and the Birds	85.00		
Publication — Birds of the Elbow	4.81	451.41	
Donations — General		217.67	
1975 Summer Meeting (Naicam)		259.00	
Interest (Savings account and bonds)		1,054.72	
Sales from Blue Jay Bookshop	8,902.19		
Less: Cost of sales	6,364.43		
Gross profit (28.5% of sales)	2,537.76		
Less: Postage, advertising, supplies, etc.	457.69		
Honoraria ($832.00, $22.78)	854.78		
Net profit (13.8% of sales)		1,225.29	3,208.09
			12,966.79

EXPENSE			
Printing of *Blue Jay* (4 issues)		7,964.31	
Printing of Blue Jay Index	2,240.20		
Less: Special credits	1,735.00	505.20	
Printing of Birds of Rosetown-Biggar	2,654.02		
Less: Special credits	300.00	2,354.02	
Adv. and promotion: Newsletter (3 issues)	1,579.06		
$36.00 plus Bkshop to AOU $200	236.00	1,815.06	
1974 Annual Meeting (Moose Jaw)		132.59	
Honoraria ($600.00, $200.00, $19.67)		819.67	
Postage		506.47	
Office supplies and stationery		274.89	
Office equipment: addressograph plates		123.23	
Affiliation fees		57.00	
Miscellaneous office and admin. expense		141.13	
Delegates expense		256.40	14,949.97
EXCESS OF EXPENDITURE OVER INCOME			1,983.18

Statement of Assets and Liabilities at September 30, 1975

ASSETS		
Cash on hand (Bookshop)		$ 40.00
Cash in bank (chequing) — SNHS	$ 2,067.55	
— Bookshop	1,363.25	
Cash in bank (savings) — SNHS	10,486.04	13,916.84
Canada Savings bonds		5,000.00
Stock on hand (Bookshop)		1,725.01
Accounts receivable — ($439.34 less prepaid orders $27.75)		411.59
Deposits with Postal Department ($100.00, $150.00)		250.00
		21,343.44

LIABILITIES			
Trust Fund re: Sanctuaries and Conservation Areas			
Balance at September 30, 1974		4,693.27	
Plus donations during past year		67.00	
		4,760.27	
Big Gully Sanctuary — Lease and taxes (1975, part '74)	$ 659.37		
Less donations during past year	320.00	339.27	4,420.90
Sandhill Crane Migration Camp — balance Sept. 30, '74		72.50	
1974-75 expense $61.75 less donations $30		31.75	40.75
Province of Sask. — Grant for Special Publication			1,000.00
Accounts Payable — Printing of Birds of Rosetown-Biggar		2,614.02	
— Estimated cost of Sept. *Blue Jay* (Sept. 1975)		1,950.00	4,564.02
Donation for colour pages in *Blue Jay*			329.25
Owing re: honoraria ($150.00, $432.00)			582.00
Suspense account			11.50
Education tax			34.39
NET WORTH			
Balance at September 30, 1974		12,851.47	
Less: Funds returned to Yorkton NHS	130.66		
Adj. of Bookshop honorarium prior to '75	377.00		
Deficit for year ending Sept. 30, 1975	1,983.18	2,490.84	10,360.63
			21,343.44

SASKATCHEWAN NATURAL HISTORY SOCIETY

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